ORDER

6690.3A

MAINTENANCE OF VOICE SWITCHING AND CONTROL SYSTEM (VSCS)

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

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FOREWORD

1. PURPOSE.

This handbook provides guidance and prescribes technical standards and tolerances, and procedures applicable to the maintenance and inspection of the Voice Switching and Control System (VSCS) facilities. It also provides information on special methods and techniques which will enable maintenance personnel to achieve optimum performance from the equipment. It augments information available in instruction books and other handbooks, and complements the latest edition of Order 6000.15, General Maintenance Handbook for Airway Facilities.

2. DISTRIBUTION.

This directive is distributed to selected offices and services within Washington headquarters, William J. Hughes Technical Center, Mike Monroney Aeronautical Center, regional Airway Facilities divisions, and Airway Facilities field offices having the VSCS equipment.

3. CANCELLATION.

This Order cancels Order 6690.3, Maintenance of Voice Switching and Control System, dated 12/20/95 and Order 6690.3 CHG 1, Maintenance of Voice Switching and Control System, dated 1/15/97.

4. MAJOR CHANGES.

This order completely revises, and expands maintenance information from canceled Order 6690.3 and 6690.3 CHG 1. Field comments have been incorporated with the following changes:

a. Provides technical characteristics for new Type 3 trunks and Ethernet Bus-Lan Repeater.

b. Updates standards and tolerances with accepted field suggestions.

c. Revises and updates preventive maintenance schedule.

d. Revises and updates preventive maintenance procedures with accepted field suggestions.

5. MAINTENANCE AND MODIFICATION POLICY.

a. Order 6000.15, this handbook, and applicable equipment instruction books shall be consulted and used together by the maintenance technician in all duties and activities for the maintenance of the VSCS. These documents shall be considered collectively as the single source of maintenance policy and direction authorized by the Airway Facilities Service. References located in the Chapters of this handbook entitled Standards and Tolerances, Periodic Maintenance, and Maintenance Procedures shall indicate to the user whether this handbook and/or the equipment instruction books shall be consulted for a particular standard, key inspection element or performance parameter, performance check, maintenance task, or maintenance procedure.

b. The latest edition of Order 6032.1, Modifications to Ground Facilities, Systems, and Equipment in the National Airspace System (NAS), contains comprehensive policy and direction concerning the development, authorization, implementation, and recording of modifications to facilities, systems, and equipment in commissioned status. It supersedes all instructions published in earlier editions of maintenance technical handbooks and related directives.

6. FORMS LISTING.

In addition to the forms required by Order 6000.15, use FAA Form 6000-8, Technical Performance Record to record the performance of VSCS. The form is available under National Stock Number (NSN) 0052-00-686-0001, in units of pads, 50 sheets per pad.

7. RECOMMENDATIONS FOR CHANGES.

This handbook is under configuration management control as defined in the latest edition of Order 1800.8 National Airspace System Configuration Management, and NAS-MD-001, National Airspace Configuration Management Document. Any changes to the baseline document or request for deviation from national standards shall be processed through the NAS Change Proposal (NCP) process. Copies of FAA Form 1800-2, NAS Change Proposal, are provided in the back of this handbook.

for George W. Terrell
Program Director for Operational Support

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CHAPTER 1. GENERAL INFORMATION AND REQUIREMENTS

1. OBJECTIVE.

This handbook provides the necessary guidance, to be used in conjunction with information available in instruction books and other handbooks, for the proper maintenance of the Voice Switching and Control System (VSCS).

2. SAFETY.

Personnel should observe all pertinent safety precautions and Electrostatic Discharge (ESD) handling procedures when working on the equipment. Refer to Order 6000.15 for guidance.

3. AIRCRAFT ACCIDENT.

a. The NAS Operations (AOP) and Operational Support (AOS), along with the onsite Airway Facilities (AF) organizations are responsible for the evaluation and documentation of the technical performance of the facilities that were, or might have been, involved in an aircraft accident. This requires that facility operational data be obtained and recorded in the maintenance logs and meter reading forms. These recorded events are official documents and may be used by an aircraft accident/incident investigation board in the determination of the facility operational status at the time of the accident. To avoid any misinterpretation of the data, the entries shall be complete, clear, concise, and accurate. The latest edition of Order 8020.11, Aircraft Accident and Incident Notification, Investigation, and Reporting, should be consulted for details.

b. Minimum data must be obtained and recorded for any Air Traffic Control (ATC) functionality involved in an aircraft accident. Check the VSCS operating equipment record to ascertain that there has been no changeover in equipment. If a changeover has occurred, both sets of equipment must be checked. The following data must be extracted from the system in support of the accident/incident investigation ten minutes prior to the time of the reported incident and ten minutes after the reported incident:

(1) Maintenance log data — tape backup

(2) Traffic data log data — tape backup

(3) Exception report file data — tape backup

(4) Tandem Oprlog data — tape backup

c. If any system component failed or was mode transitioned from the online primary state to any other state during the ten minute window prior to or after the estimated time of an incident, that component will be placed in the online primary state, verified with an operational air to ground (A/G) check, and system recertified.

d. Certify the maintenance and facility log entries. Have another technician or the supervisor also certify the log entry.

e. If a check of the facility or VSCS equipment indicates that primary power was distorted or interrupted, record the events. If the power has been determined to be a factor, then verify that the current condition of the power source is within acceptable limits.

4. COORDINATION.

Maintenance activities shall be closely coordinated at all times with Air Traffic Operations (ATO) personnel in order to prevent unanticipated interruption of services. Certified electronic technicians assigned to the facility, where the equipment is installed, shall be responsible for maintaining the equipment. Cognizant ATO personnel shall be advised immediately of equipment failure, restoration to service, or out of tolerance conditions. ATO personnel shall be advised of any situation that may adversely affect equipment operation. Air traffic personnel are expected to release the equipment to maintenance in a timely manner when requested to do so.

5. PRECAUTIONS WHEN USING TEST TONES.

When making checks on any receiving channel, extreme care should be exercised to avoid applying test tones or other signals in excess of those prescribed by the procedures of this directive. Annoyance or damage to operating personnel hearing may occur if the interfering signals are delivered to controller positions or are intercepted by other maintenance personnel at other points in the system.

6. FLIGHT INSPECTION.

No flight inspections are required to maintain the VSCS.

7. TECHNICAL INSPECTION.

Formal inspections are among the more effective management controls for assuring the required quality level of maintenance work and of equipment and system performance. See Order 6000.15, and the latest edition of Order 6040.6, Airway Facilities NAS Technical Evaluation Program, for further details.

8. PERIODIC MAINTENANCE.

Maintenance personnel shall follow the tasks and schedules provided in Chapter 4, Periodic Maintenance, which includes the minimum essential preventive maintenance activities and the frequency with which they shall be performed to meet the minimum performance standards for the VSCS. When replacing LRU's, record bar codes in accordance with the Bar Code System User Manual, 184609.

9. CERTIFICATION REQUIREMENTS.

Refer to Order 6000.15, for general guidance on the certification of systems, subsystems, and equipment. Refer to Appendix 1, of the latest edition of Order 6470.29, Maintenance of En Route Air-to-Ground Communications Facilities, for the specific requirements applicable to the certification of Air Route Traffic Control Centers (ARTCC) Air-to-Ground (A/G) communication functionality of the VSCS. System level certification is required for the VSCS A/G functionality and associated A/G equipment.

10. AUTOMATION SERVICE REPORTING TERMINOLOGY.

This paragraph conveys common definitions for use by the Airway Facilities headquarters and field personnel in reporting facility performance at an FAA national level. Computer service interruptions and other equipment deficiencies have not been uniformly reported, and local data has not consistently agreed with national performance reports. Various reporting facilities have sometimes used the same reporting terms in different ways. These facilities have reported scheduled startover or outages that others would have reported as unscheduled. Therefore to assure that all automation service interruptions are reported and interruption data can be correlated, definitions in the latest edition of Order 6040.15, National Airspace Performance Reporting System (NAPRS) and Maintenance Management System (MMS), shall be used.

11. REFERENCES.

a. The following list of publications are referenced in this handbook:

(1) 1800.8, National Airspace System Configuration Management

(2) 6000.15, General Maintenance Handbook for Airway Facilities

(3) 6032.1, Modification to Ground Facilities, Systems, and Equipment in the National Airspace System

(4) 6040.6, Airway Facilities NAS Technical Evaluation Program

(5) 6040.15, National Airspace Performance Reporting System

(6) 6470.29, Maintenance of En Route Air-to-Ground Communications Facilities

(7) 6500.9, Maintenance of Backup Emergency Communication (BUEC) Facilities

(8) 6650.4, Maintenance of Voice Frequency Signaling System Equipment (VFSS)

(9) 8020.11, Aircraft Accident and Incident Notification, Investigation, and Reporting

(10) TI 6030.1, User's Manual for the Maintenance Management System (MMS)

(11) TI 6690.19, VSCS System Maintenance Manual

(12) TI 6690.21, VSCS Software User's Manual

b. Also, a listing of related publications useful to technical personnel may be found in Appendix 1 of Order 6000.15, and Section 1 of TI 6690.19.

12.–19. RESERVED.

CHAPTER 2. TECHNICAL CHARACTERISTICS

20. PURPOSE.

The VSCS provides A/G voice channel connectivity between air traffic controllers and pilots, while also providing ground-to-ground (G/G) intercom (IC) and interphone (IP) voice connectivity between air traffic controllers within the Air Route Traffic Control Centers (ARTCC) and controllers in adjacent facilities.

21. FUNCTIONAL DESCRIPTION.

a. The VSCS is an automated A/G and G/G voice switching and control system for ARTCC Facilities. The VSCS permits the selection, interconnection, activation, and reconfiguration of communication paths between controller positions, and communication resources. The VSCS initiates keying of external A/G radios, switches between redundant equipment and circuits, and indicates and confirms status of remote communication resources. The VSCS provides the G/G communications connectivity and control of inter-facility, and intra-facility resources. Both A/G and G/G communications are initiated through the controller VSCS console equipment (VCE). The VSCS accommodates a range of facility sizes of 50 to 430 VCE positions.

b. VSCS Functional Areas. The VSCS is divided into functional areas used to organize the subsystems within the VSCS. The functional areas are identified by a sequence of numbers and letters referred to as reference designators (Ref. Des.), or Unit numbers. Reference designators are used by the VSCS maintainer to identify and locate components of the system. The block diagram illustrated in figure 2–1, identifies the following VSCS equipment:

Functional Area	P/O	Unit
Discrete Monitor and Control (DMC)	CS	1&6
VSCS Console Equipment (VCE)		2
Control Subsystem (CS)		3
Workstations	CS	3A15A
G/G Switch Nodes	SS	4
A/G Switch A & B	SS	5
Timing Equipment Rack	SS	6A1
Intermediate Distribution Frames	SIS	10
Ancillary Rack	SS	11
A/G and G/G BusLANs	SIS	13, 14
Liebert Power Control Conditioners	SIS	18

NOTE: Part of (P/O)
Switching Subsystem (SS)
System Interconnect Subsystem (SIS)

22. HARDWARE DESCRIPTION.

a. General. The VSCS consists of seven hardware subsystems referred to as hardware configuration items (HWCI). The HWCI's are categorized into groups of overall service, (i.e., voice communication switching, system interconnect cabling, etc.), and may consist of more than one functional area/Unit. Table 2–1, lists the VSCS HWCI's, and identifies their associated Unit numbers. The following paragraphs briefly discuss the HWCI's. For detailed information on the HWCI's, refer to TI 6690.19, VSCS System Maintenance Manual.

NOTE: HWCI 4 is not used in the VSCS configuration. HWCI 6 is installed at the FAA Technical Center only; no further discussion will be provided here.

b. Console Equipment Subsystem (HWCI–1). The Console Equipment Subsystem provides the air traffic controller access to A/G, and G/G resources. This subsystem is comprised of the VCE. The VCE hardware includes, two touch entry video display monitors, a G/G indirect access keypad, an A/G and G/G speaker, two dual jack modules (DJM), and a 80386 central processing unit (CPU). The VCE transmits and receives digital voice to and from both A/G switches, and with its designated G/G node. The VCE provides the Control Subsystem, diagnostic and ATC call traffic data. Upon startup, the VCE receives ATC position map adaptation, and its software image from the Control Subsystem. The VCE provides two channels of analog voice output to the FAA High Capacity Voice Recorder (HCVR) subsystem (not part of the VSCS).

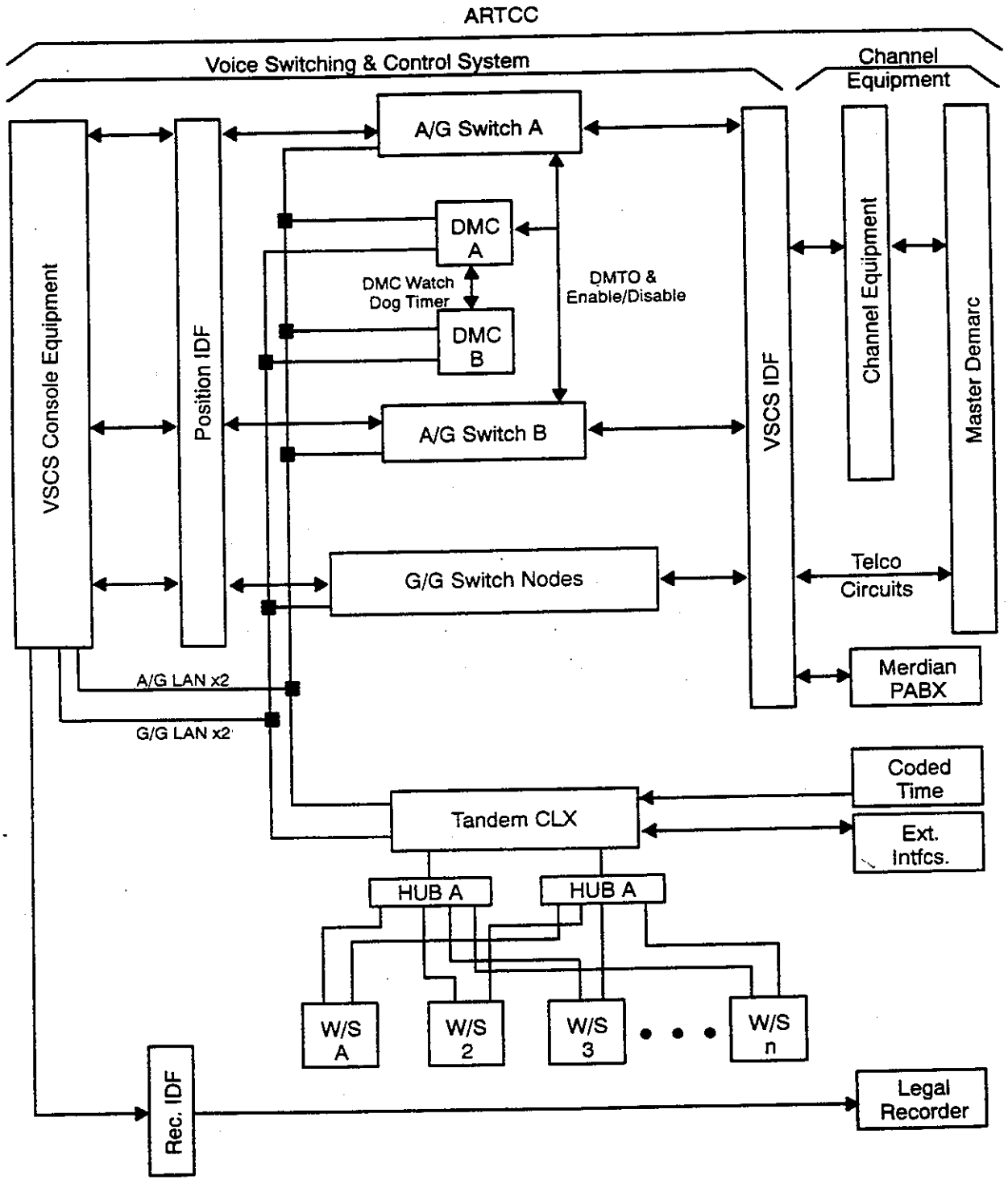


FIGURE 2-1. VSCS EQUIPMENT BLOCK DIAGRAM

TABLE 2-1. VSCS HWCIS

HWCI	Hardware Subsystem	Unit
1	VCE Subsystem	2
2	Switching Subsystem	4, 5, 6, 11
3	MPES	1
5	Control Subsystem	3
6	Contractor Traffic Simulation Unit (CTSU) (FAATC only)	7
7	System Interconnect Subsystem	10, 13, 14, 18
8	VCE Trainer (VCET)	n/a

c. Switching Subsystem (HWCI-2). The Switching Subsystem provides A/G and G/G communication connectivity between the air traffic controller and the ARTCC external resources. The Switching Subsystem is divided into two major parts, the A/G switch, and the G/G switch. This subsystem incorporates three components of the Harris Corporation 20/20 Single Circuit (SC) digital switch. The configurations are: A/G position node (P-Node), A/G radio node (R-Node), and G/G node. Each node supports a specific configuration of communication circuits.

(1) A/G Switch. The A/G switch consists of two redundant switches identified as Switch A and Switch B. The A/G switch provides the air traffic controller connectivity to all A/G communication resources such as Local radio, Remote Control A/G (RCAG), and BUEC. The A/G switch provides the air traffic controller via the console equipment the capability of selecting local and remote radio transmitters/receivers, BUEC, and routing of A/G audio communication to/from the console position.

(2) G/G Switch. The G/G switch provides communication capabilities such as intercom (IC), interphone (IP), access to external networks via the private automatic branch exchange (PABX), and call management functions such as, call forward, call transfer, meet me, and progressive conferencing capabilities. The G/G switch can consist of up to 12 nodes.

d. Maintenance Position Equipment Subsystem (MPES) (HWCI-3). The MPES, is the VSCS maintenance area, for use by the system maintainer. From this position the maintainer monitors the system's health, performs failure recovery actions, isolates equipment faults, troubleshoots the system, and generates maintenance reports. The Test Equipment rack located in the MPES area, includes a transmission impairment measurement set (TIMS), and channel selector, to provide the maintenance technician, access to all A/G and G/G audio circuits. The MPES also consists of two workstations (ws), one ws printer, an event message monitor (EMM) ws, Tandem operations console (OPS CSL), and two VCE's.

e. Control Subsystem (HWCI-5). The Control Subsystem provides support of system management functions, configuration database maintenance, and the ability to monitor the status and control of all VSCS subsystem components. The control subsystem hardware consists of the Tandem CLX computer, Discrete Monitor and Controller (DMC), and personal computer (PC) based workstations. Processing capabilities and mass storage resources for VSCS software are furnished for all system activities. Redundant A/G and G/G local area networks (LAN) interconnect the various VSCS subsystems providing status monitoring, map adaptation and software downloads.

f. System Interconnect Subsystem (SIS) (HWCI-7). The SIS provides the signal connections between all stand-alone cabinets and unit pieces of equipment. The SIS includes power cables, signal cables, intermediate distribution frames, patch panels, A/G, G/G and workstation LAN connections, power conditioners, and system cables. The SIS connects HWCI's 1, 2, 3, and 5.

g. VCE Trainer (VCET) (HWCI-8). The VCET is a stand-alone self guided portable trainer for air traffic controllers, supervisors, and area managers.

The VCET provides all functionality of a VCE position except voice audio routing. The VCET consists of two primary units, a VCET Personal Computer (VPC), and a VCE.

(1) VPC. The VPC controls the VCET, maintains mass memory for training and site specific maps, and provides the computer human interface (CHI) simulation of the VSCS supervisor workstation. The VPC consists of the following equipment:

(a) Personal Computer

(b) Video Graphic Adapter (VGA) Monitor

(c) 101-Key Enhanced Keyboard

(d) Three-Button Serial Trackball

(2) VCE. The VCE provides operators with the actual interface equipment present in VSCS ATC positions (except an A/G loudspeaker (LS)). The VCET VCE consists of the following equipment:

(a) Two VSCS Display Module (VDM's)

(b) VSCS Equipment Module (VEM)

(c) Two DJM's

(d) G/G Loudspeaker

(e) VSCS Interactive Keypad (VIK)

23. SOFTWARE DESCRIPTION.

a. General. The VSCS software is segmented into six computer software configuration items (CSCI). The CSCI's are unique functional divisions of the VSCS software. Portions of the VSCS application software is installed on firmware devices. Table 2-2, identifies the CSCI to HWCI relationship. This table also lists the firmware devices installed on the various VSCS hardware components. The following paragraphs briefly describe the six VSCS CSCI's. For detailed information regarding the VSCS application software, refer to TI 6690.21, VSCS Software Users Manual.

NOTE: CSCI-3 is not used in the VSCS. The Contractor Traffic Simulation Unit, CSCI-7, is located at the FAA Technical Center only and will not be discussed here.

b. On-Line Operations Control (CSCI-1). The On-line Operations Control software is used for overall control of the VSCS. CSCI-1, resides in the Tandem CLX. It interfaces with external VSCS and FAA devices, and controls the Air Traffic (AT) supervisors point of entry for requesting and managing console position reconfigurations. The On-line Operations Control software also provides the NAS Operations Manager and the VSCS maintainer with interface for monitoring and controlling system performance.

c. G/G Switch Control (CSCI-2). This software provides voice switching and connectivity control features for G/G communications. The G/G Switch Control software resides in each G/G switch node. It provides all voice interconnections among positions within the ATC facility and between ATC facilities. It continually runs built-in-test (BIT), diagnostic tests and reports status to the On-line Control Subsystem.

d. Common Console (CC) Communications Control (CSCI-4). The VCE application software provides the A/G and G/G system interface for the air traffic controller at the console equipment. The CC software resides in each VCE position and is downloaded via the Tandem upon console startup. This software also receives and interprets operator touch entry actions and controls the state of the display for A/G calls, G/G calls, and other communication functions. It continually runs BIT diagnostic tests and reports status to the On-line Control Subsystem.

e. A/G Switch Control (CSCI-5). The A/G Switch Control software provides the direct interface to the existing radios. The software provides selection and control of radio transmitters and receivers located at both local and remote sites from ATC positions. This software also provides confirmation indications for A/G communication operations to the VCE Subsystem, reports status of BIT to the Control Subsystem, and provides the controlling interface to the A/G switch hardware.

f. Off-Line Support Services (CSCI-6). Based in the Control Subsystem hardware, the Off-line Support software is used to edit the system configuration map database, record and reduce traffic data, and to run fault isolation diagnostic and verification tests. These support functions can be accessed from any of the Control subsystem workstations and operations console.

g. VCET (CSCI–8).

(1) The VCET software provides CHI training for the Air Traffic Control (ATC) specialist and supervisor positions by performing the following:

(a) ATC Supervisor position operations

(b) A/G CHI operations

(c) G/G CHI operations

(d) VSCS Indirect Access Keypad (VIK) operations

(e) Loudspeaker operations

(f) Push-to-Talk (PTT) operations

(2) The VCET also provides A/G, G/G, and supervisory graphic displays for training, by using the stored Universal Training Map (UTM) and site specific maps. For Air Traffic Control specialist training, CSCI–8 emulates the interfaces between the operator displays, the A/G and G/G.

(3) Switch Subsystems, and the On-line Control Subsystem. For Supervisor training, CSCI–8 emulates the interfaces between the supervisor workstation and the On-line Control Subsystem.

TABLE 2–2. CSCI TO HWCI RELATIONSHIP

CSCI	Hardware Subsystem	HWCI	Unit/ Reference Designator	Firmware Devices
1	Tandem CLX	5	3	n/a
1	DMC	5	1 & 6	Main, LAN CCA's
1	Workstations	5	3	n/a
2	G/G Switch	2	4	HCPU, SBIU
4	VEM	1	2	Main, Switch, LAN, Analog, CCA's
5	A/G Switch	2	5	HCPU, SBIU
6	Tandem CLX	5	3	n/a
8	VCET	8	No Unit No.	Main

NOTE: Circuit Card Assembly (CCA)
High-Speed Central Processor Unit (HCPU)
Switch Bus Interface Unit (SBIU).

Section 1. EQUIPMENT DESCRIPTION

24. TEST EQUIPMENT RACK (Unit 1A5).

The test equipment rack provides the built-in hardware capability to measure voice channel performance characteristics and display the results at the maintainer workstation. Voice channel test (VCT) equipment, located within the maintainer test equipment rack, consists of a patch panel, two line amplifier/attenuation pad modules, transmission impairment measurement set (TIMS), and a programmable channel selector. Additional patch panels and test jack assemblies are at each intermediate distribution frame (IDF). These patch panels provide for convenient monitoring points throughout the system as well as the capability to manually configure, using patch cords, a circuit for voice channel testing. The test jack assemblies provide a means to route all signals, equipment or line side, to the MPES patch panel for test or monitoring purposes. The programmable test equipment (TIMS and channel selectors) permits the maintainer to automatically configure and perform parametric tests on offline voice frequency (VF) circuits within the VSCS. This equipment is controlled from the VCT software resident in the Control Subsystem and initiated from a maintainer workstation.

a. TIMS (1A5A5). The TIMS is a multi-function test set that measures the quality of the voice grade, program, and wideband data communications channels. The TIMS is designed for problem isolation on high speed data transmission circuits. It is programmable by remote control and provides a test generator/test receiver to automatically perform key VF channel performance tests on command.

b. Channel Selectors (1A5A6). The programmable channel selectors route to any switch node to test or validate non-allocated offline equipment, access non-allocated and offline circuits or trunks for service verification, and perform maintenance test loop-backs.

c. Patch Panel (1A5A2). The MPES test equipment jack patch panel provides the maintainer localized patch panel access, via the A/G and G/G IDF test jack assemblies, to perform automatic and manual testing, fault isolation, and monitoring of incoming voice circuits to the VSCS. This patch panel connects to all radio, BUEC, and trunk/PABX IDF test jacks.

d. Line Amplifier Chassis (1A5A3). The line amplifier chassis houses the modules that provide the necessary gain or attenuation level adjustments required during external VCT loopback tests on selected switch interface cards. Those interface cards requiring a level adjustment are the BUEC, VFSS, Grim, and +7/−16 trunk cards.

25. CONSOLE EQUIPMENT (Unit 2).

a. General. The air traffic VSCS console equipment (VCE) includes all equipment from the controller position to the VSCS position IDF.

b. VSCS Display Module (VDM). The VDM, two per console position, provides the display and data entry functions to support controller A/G and G/G requests, and channel equipment status. The VDM consists of, an interactive color video monitor with an infrared (IR) touch entry device (TED), monitor electronics for video, brightness/degaussing control, and fault status. The VDM is the controllers interface for initiating communication paths between the console and the A/G and G/G channel equipment.

c. VSCS Equipment Module (VEM). The VEM supports controller inputs, display and audio outputs, and call processing of the VCE.

(1) VEM inputs include A/G and G/G voice signaling, command and configuration messages from the Control Subsystem, peripheral inputs from the touch entry device, PTT switches, indirect access keyboard, and controller voice.

(2) VEM outputs include A/G and G/G digital voice plus signaling, position status messages to the Control Subsystem, VDM and keyboard display data, and controller headset and loudspeaker audio.

(3) VEM processing functions support the VCE software, physical interfaces, and BIT diagnostics.

d. VSCS Indirect Access Keyboard (VIK). The VIK provides input to the VEM main card for dialing calls. The VIK includes a standard

telephone-type 3x3x1 illuminated numeric keypad with three function keys, an LED message display of two 16 character rows to display system messages and operator inputs. The VIK has two modes: message mode for displaying system messages to the operator and digit collection mode, which allows the controller to enter an IC/IP number or special function number.

e. Dual Jack Module (DJM). A DJM provides termination for two headset/handsets (HS), referred to as HS A1 and A2. Two parallel DJM's are provided at each controller position and provides the total interface connection for four HS's. The DJM provides a presence signal to the VEM which causes the VDM to brighten while an HS is present. At least one HS must be connected to activate the console position equipment. HS's A1 and B1 provide local PTT preemption capability over HS A2 and B2, respectively.

f. G/G LS Module. The module consists of an LS, volume control, two HS volume controls, chime on/off control, chime volume control, and a green, light emitting diode (LED), chime status indicator. The speaker is designed to handle 5 watts of power. The impedance of the speaker is nominally 8 ohms. The speaker has nominal acoustic response of approximately 90 decibel (dB) sound pressure level at 1 meter with 1 watt of drive power.

(1) The LS volume control has a, resistance of 5K ohms, power rating of 2 watts, with a linear taper characteristic. All terminals of the device are cabled to the VCE controller and are isolated from ground. The control shaft is at chassis ground potential.

(2) The HS volume controls are the same as the LS volume controls. The HS volume controls provide −52 dBm to −20 dBm adjustment range.

g. A/G LS Module. The A/G LS module is the same as the G/G LS except there is no chime volume control, LED, or ON/OFF control. The module consists of an LS, LS volume control, and two headset volume controls for control of voice levels to A/G LS and headset/handsets A1 and A2.

26. CONTROL EQUIPMENT (Unit 3).

a. Tandem CLX. The Tandem CLX Computer System provides the computing resource for the Control Subsystem of the VSCS. The Tandem CLX Computer System provides for the storage and maintenance of the configuration and maintenance databases, internal and external interface functions for the VSCS, and management of the configuration and reconfiguration processes. The VSCS Tandem CLX is a 6 CPU configuration. Table 2−3 identifies some basic operating parameters for the Tandem CLX Computer System. The Tandem CLX Computer 6 CPU System consists of the following equipment:

TABLE 2−3. TANDEM CLX SPECIFICATIONS

DESCRIPTION	PARAMETERS
Instructions per second	2.2 MIPs/CPU
Random Access Memory	16 MB/CPU
I/O Channel	One channel/CPU
I/O Expansion Slots	4/cabinet
Disk/Tape Slots	6/cabinet
Interprocessor Communications Channels	2−20 MB/s
Word Size	16 bits
Addressing	32 bits

(1) Base Cabinet (Unit 3A1). The Base Cabinet can accommodate two processor boards, two expansion memory boards, two multi-function controller (MFC) boards, four Input/Output (I/O) controller boards, and six disk units. One of the disk unit slots may accommodate a cartridge tape drive unit. Refer to the Nonstop CLX Systems Maintenance Manual, 49717, for further information on Tandem CLX. Figure 2–2, identifies a typical VSCS CLX configuration.

(2) System Cabinet (Unit 3A2 & 3A3). The System Cabinets are similar to the Base Cabinet except, the Base Cabinet contains a System Control Panel and an external alarm port.

(3) High Speed Printer (Unit 3A6). A high-speed line printer is connected to the Tandem Computer System to provide on-line printing capability for the operator. Maintenance Logs, Traffic Logs, Data Entry Operator (DEO) reports can be sent to this printer via the workstation CHI. Tandem operation reports can also be queued to this high speed printer.

(4) Operations Console (Unit 3A7). The Tandem Operations Console is used for operation and maintenance of the Control Subsystem. It is used to start up the Control Subsystem during VSCS startup. This terminal provides the interface for testing and checking the Tandem CPU's and associated hardware. The OPS CSL is functionally part of the Control Subsystem but is physically located at the MPES position.

b. DMC. The DMC monitors and collects status from the A/G switch shelves, timing equipment, and equipment rack over temperature sensors. Upon a catastrophic switch failure of the active A/G switch, the DMC will control the automatic switchover to the backup A/G switch. A/G switchover can be initiated automatically from either a NAS Operations Manager (NOM), maintainer, or AT supervisory workstation, and manually from the DMC front panel controls.

(1) The VSCS A/G communication availability is accomplished through the use of redundant DMC's. The VSCS A/G communication high availability is accomplished through the use of redundant DMC's. One DMC is located in the Timing Equipment Rack (6A1) and the other in the Test Equipment Rack (1A5).

(2) The DMC operates independently of the Control Subsystem during a control subsystem failure. In order to ensure autonomy of the DMC from the Control Subsystem CPU, A/G Switch failures that precipitate failovers are received by the DMC directly from the A/G Switch via digital inputs and the A/G Local Area Network (LAN). The Control Subsystem performs A/G Switch Mode control, maintains Logical Unit/Logical Entity (LU/LE) status, and coordinates with the DMC in ensuring a timely and consistent data set among the VSCS system elements. The DMC performs the following functions:

(a) Monitors and collects A/G switch shelf status for detection of switch failure.

(b) Controls A/G switch switchovers when the DMC detects failure of the active A/G switch, or when the DMC receives a manual command from the maintenance workstation, or the DMC front panel.

(c) Monitors and collects status from the timing subsystem for failure detection.

(d) Monitors overtemperature alarm inputs of equipment racks.

(e) Relays all collected system status to the Tandem CLX, upon receiving a status poll request.

(3) DMC-to-DMC Intercommunication. The DMC Controllers intercommunicate (DMC–A with DMC–B) and communicate with the Control Subsystem and other VSCS subsystems via the redundant A/G and G/G LAN's (see figure 2–7).

(4) DMC-to-LAN Interface. Based on the distribution of traffic load on the LAN's, the following are the first choice of LAN for communication between the identified subsystems:

(a) Control Subsystem to/from the DMC — G/G LAN

(b) DMC to/from the DMC — A/G LAN

(c) DMC to/from VCE — A/G LAN

(5) DMC–A/G Switch Enable/Disable. The function of the enable/disable signal is to control the operation of the A/G Switch R–Node, by enabling or disabling the radio/BUEC interface cards, thus placing the A/G Switch in an operational (primary) or non-operational (backup) state. The enable/disable, RS–422 signal, provides a differential voltage which activates 1 of 4 (1 of 2, BUEC)

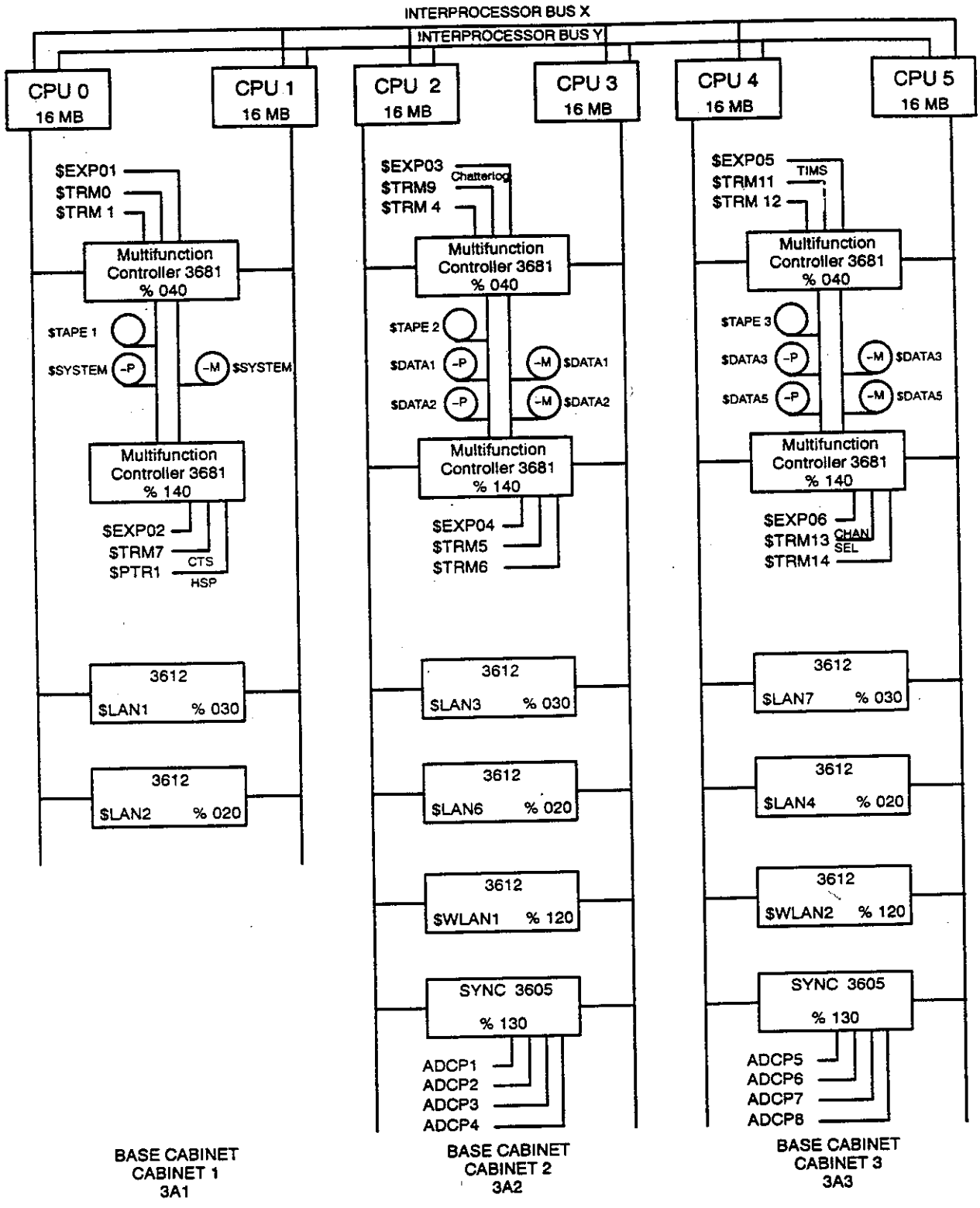


FIGURE 2–2. TANDEM CLX MACKIE DIAGRAM

radio interface cards located in the R–Nodes. The health of A/G Switches are monitored by the DMC's, which provide redundant enable/disable signals to each R–Node. The enable signals are cross-strapped such that each A/G switch gets two copies of the enable signals from each of the two DMC's. Fixed hardware within the A/G switches derives a composite enable signal from the dual enables, so that even with one failed DMC, the correct composite enable or disable signal is applied to the appropriate switch.

(6) DMC to A/G Switch Dead Man Timeout (DMTO). The DMTO signal provides the DMC's with the health status of the A/G switch common equipment shelf. Each A/G switch common equipment shelf provides a DMTO signal to each DMC; total of 8 separate digital signals.

c. Workstations. Workstations provide AT supervisors, NAS Operations Managers, maintainers, and DEO personnel, the CHI to the VSCS. The workstations allow for monitoring, controlling, and managing VSCS functionality and resources. The workstations consist of a 486 SX-based personal computer, keyboard, VGA monitor, track ball, and dot matrix printer. Each workstation has redundant links to the Tandem CLX, via the workstation EtherNet LAN.

27. G/G SWITCHING EQUIPMENT (Unit 4).

a. General. The G/G switch is that portion of the Switching subsystem that allows the electronic switching of G/G interfaces and trunk/PABX resources to any controller position. G/G Switch configuration can consist of a maximum of 12 nodes. Each G/G node is contained within a single Control cabinet and provides interconnection for a maximum of 38 controller positions, 48 trunks, six PABX tielines, 12 supervisory recorder tielines, four A/G tie lines, and three weather lines.

b. Control Cabinet. The Control cabinet has redundant common equipment shelves (shelf "A" and "B"), and redundant position and telephone interface cards.

c. Fiber Optic Tie Trunk (FOTT) Cabinet. The FOTT cabinet is required for every two Control cabinets. The FOTT cabinet has the same functionality as that described for the A/G switch.

d. G/G Trunk Types. The G/G trunk circuits provide the connection from the VCE to interphone (IP) call processing and voice connectivity to remote facilities. These external trunks are leased line trunks connected to the VSCS IDF through the master demarc. Table 2–4 describes the signalling methods used for calls using these trunks.

28. A/G SWITCHING EQUIPMENT (Unit 5).

a. General. The A/G Switch provides the connectivity between the ATC positions and the UHF/VHF transmitters and receivers, and BUEC transceivers. The equipment includes the primary and backup A/G Switches (A and B). These switches are identical but separate, and function in parallel and independently of each other. Either switch can provide the required A/G switching functionality. The A/G Switch consists of two nodes, the P–Node and a R–Node. The P–Node and R–Node consist of one Control cabinet, one FOTT cabinet, and up two Peripheral cabinets. The number of peripheral cabinets is dependent upon the number of A/G resources and controller positions at the facility.

b. A/G Position Node (P–Node). The P–Node provides voice circuits for controller headsets, loudspeakers, and performs the switching function between the console positions and the radio interfaces. The P–Node is capable of providing the interface of up to 430 VCE positions.

c. Radio Node (R–Node). The R–Node provides the interface between the console switching function, performed in the P–Node, and the radio interfaces. Voice and control/status information received from the BUEC and radio interfaces, is passed to the P–Node via the A/G A/G FOTT and BusLAN respectively. The R–Node has the capacity to connect to 350 radio and/or 240 BUEC interfaces. The R–Node receives configuration data from the Tandem CLX for the purpose of assignment of A/G communications. Redundant Enable/Disable signals are fed from the both DMC's to the R–Node to facilitate switching from the primary to backup A/G Switch.

d. BUEC Control. The VSCS BUEC interface provides air traffic control access to the BUEC subsystem of emergency vhf and uhf en route channels. These channels are accessed through the VDM by touching the BUEC icon, and then the frequency desired on either of the VCE VDM's. The BUEC maintenance directive is Order 6500.9A, Maintenance of Backup Emergency Communication (BUEC) Facilities. A simplified BUEC block diagram is shown in figure 2–3.

TABLE 2-4. VSCS TRUNK TYPES AND SIGNALLING METHODS

Type	Description	Outbound Signaling	Inbound Signaling	Uses
3 (2W)	Manual ring with loop signaling.	Automatic ringdown or voice page.	Ring signalling.	VSCS position to a special phone in same facility; intercom comm.
3 (4W)	Manual ring with tone-burst signalling	Automatic ringdown or voice page. Manual re-ring.	Automatic ringdown	Manual ring call. Called position must have DA for trunk.
3 (4W)	Loop/Loop Fully Supervised	Automatic, Non-Selective	Automatic, Non-Selective	VSCS position to another facility
3 (4W)	Loop/Loop Answer Supervised	Automatic, Non-Selective	Automatic, Non-Selective	VSCS position to another facility
3 (2W)	Loop Out/20 Hz In	Loop Start, Non-Selective	Ringdown, Non-Selective	VSCS position to another facility
4	Selective Signalling (SS-1 or SS-4), 4W 2600/2400 Hz	Voice page signalling outbound.	Dial signalling inbound.	Multi-point communication. SS-1 =2 digit, SS-4=3 digit.
5	Selective Signalling (SS-1 or SS-4), 4W 2600/2400 Hz	Dial signalling outbound.	Dial signalling inbound.	Multi-point communication. SS-1 =2 digit, SS-4=3 digit.
4/5	Selective Signalling (SS-1 or SS-4), 4W 2600/2400 Hz	Voice page, or dial signalling outbound.	Dial signalling inbound.	Multi-point communication. SS-1 =2 digit, SS-4=3 digit.
6	Central Office/PABX extension	Selective dial outbound	Non-selective dial inbound	VSCS position to a central office, or PABX.
7	PABX Tie Lines 4W DX or Single Frequency (SF) signalling	Dial signalling outbound.	Dial signalling inbound.	VSCS position to a VSCS position in another facility, or PABX.
8	Local Dial 2W loop start	Non selective outbound	Selective inbound	VSCS position to local facility/airline office.
9	Voice Call 4W voice detection signalling	Voice page signalling outbound.	Voice page signalling inbound	Commonly known as "voice" or "holler" line. Calls cannot be put on hold or forwarded.
20	VSCS to VSCS 4W SF signalling	VSCS logical signalling outbound.	VSCS logical signalling inbound.	Interfacility intercom, override, and conference calls.
PABX	Meridian PABX interface	Dial signalling outbound.	Dial signalling inbound.	Maximum of 40 PABX trunks per facility.

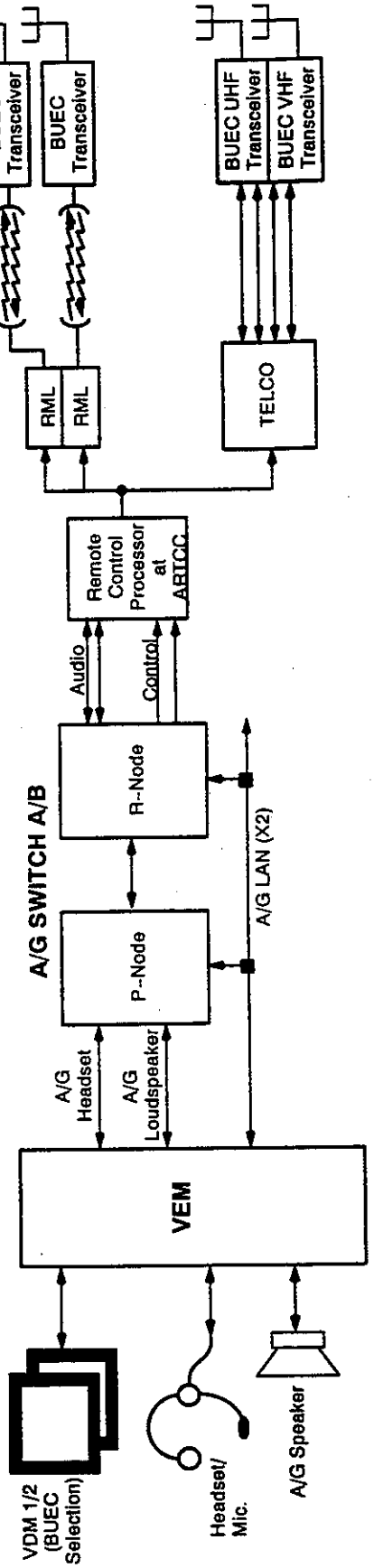


FIGURE 2-3. VSCS/BUEC INTERFACE BLOCK DIAGRAM

29. TIMING EQUIPMENT (Unit 6).

Rubidium Frequency Standard. The Rubidium Frequency Standard provides highly accurate timing reference signal to the G/G FOTT. The reference signal synchronizes digital communication for interfacing with external digital voice circuits. The frequency standard has a long term drift rate of $4x10^{-11}$ per day. The Rubidium unit provides a full status signal. In the event of Rubidium Frequency Standard failure, the FOTT receives its timing from the G/G Node Common Equipment shelf.

30. VSCS IDF's (Unit 10).

a. General. The VSCS IDF's are the interface point between the VSCS resources and the FAA VSCS IDF (VDF), Radio Interface IDF (RI IDF), and Master Demarc System (MDS). The VSCS IDF's provide the interface points for radio, VCE position, BUEC, PABX/Meridian, and high capacity voice recorder (HCVR) resources. Figure 2−4 illustrates the relationship between the VSCS IDF's and the Communications Area IDF's.

b. Radio IDF's (10A2 — 10A16). The Radio IDF's interface the VSCS A/G Switch with the RI IDF which connect the A/G control and audio signals to the ARTCC radio equipment.

c. Position IDF's (10A17 — 10A18). The Position IDF's interface the VCE position VEM with the A/G and G/G switches.

d. BUEC IDF's (10A19 — 10A24). The BUEC IDF's interface the VSCS A/G Switch with the VDF which connect the BUEC control and audio signals to the remote control equipment.

e. PABX/Trunk IDF's (10A25 — 10A29). The PABX/Trunk IDF's interface the VSCS with all 4-wire G/G trunk circuits. The PABX/Trunk IDF's interface with leased interfacility NAS communications system at the FAA MDS.

f. Recorder IDF's (10A33 — 10A34). The Recorder IDF's interface the VCE position VEM output audio signal with the FAA High Capacity Voice Recorder (HCVR).

g. 66 Block Connectors. The VSCS IDF's consist of 66 Type quick connect blocks. The front of the 66 block supports four columns of quick connect terminals. The pin column configuration is pre-terminated to one of four Amphenol style connectors at the rear of the block. The Amphenol connectors are the physical interface point to FAA resources, and they are pin-for-pin compatible with the FAA frame interfaces. The 66 blocks serve as an in/out interface panel when bridging clips are installed. The bridging clips act as cross connect jumpers that connect the FAA resources to the VSCS and can be removed for circuit isolation and test.

h. IDF Patch Panels. The Patch Panels used throughout the VSCS are two common types, 4−Wire (4W) and 6−Wire (6W), with BANTAM type jacks. The Patch Panels each have Line In/Out (to Telco), and Equipment In/Out (to VSCS) jacks for circuit isolation. Monitor (Line Side) jacks are provided for non interruptive line monitoring. Refer to figure 2−5.

(1) The 4W Patch Panels are utilized to support voice channel patching, test, and isolation on the Radio and BUEC circuits.

(2) The 6W Patch Panels are used to support the voice channel and signal lead patching, test and isolation of the G/G trunks and PABX.

i. IDF Test Jack (Jewel). The VSCS IDF provides test jacks on each of the frame segments. The test jacks allow any one audio circuit to be manually patched back to the Test Equipment Rack patch panel. The maintainer then has the capability to co-locate test equipment at the MPES area for circuit testing, isolation, and monitoring as necessary.

31. BusLAN EQUIPMENT (Unit's 13 & 14).

a. General. The VSCS incorporates three BusLAN configurations, the A/G Bus, G/G Bus, and the Common Channel Signaling (CCS) Bus. The A/G Bus, G/G Bus, and CCS Bus, each have redundant baseband buses with a linear topology, operating at 10Mbps, in accordance with IEEE−802.3 Standard Thicknet protocols. Figure 2−6, illustrates the VSCS BusLAN topology.

b. A/G BusLAN. The A/G bus provides data and control connectivity between the VCE's, DMC's, Tandem CLX, and A/G Switch nodes. The A/G BusLAN consists of A and B redundant buses. Both buses operate in an on-line primary mode.

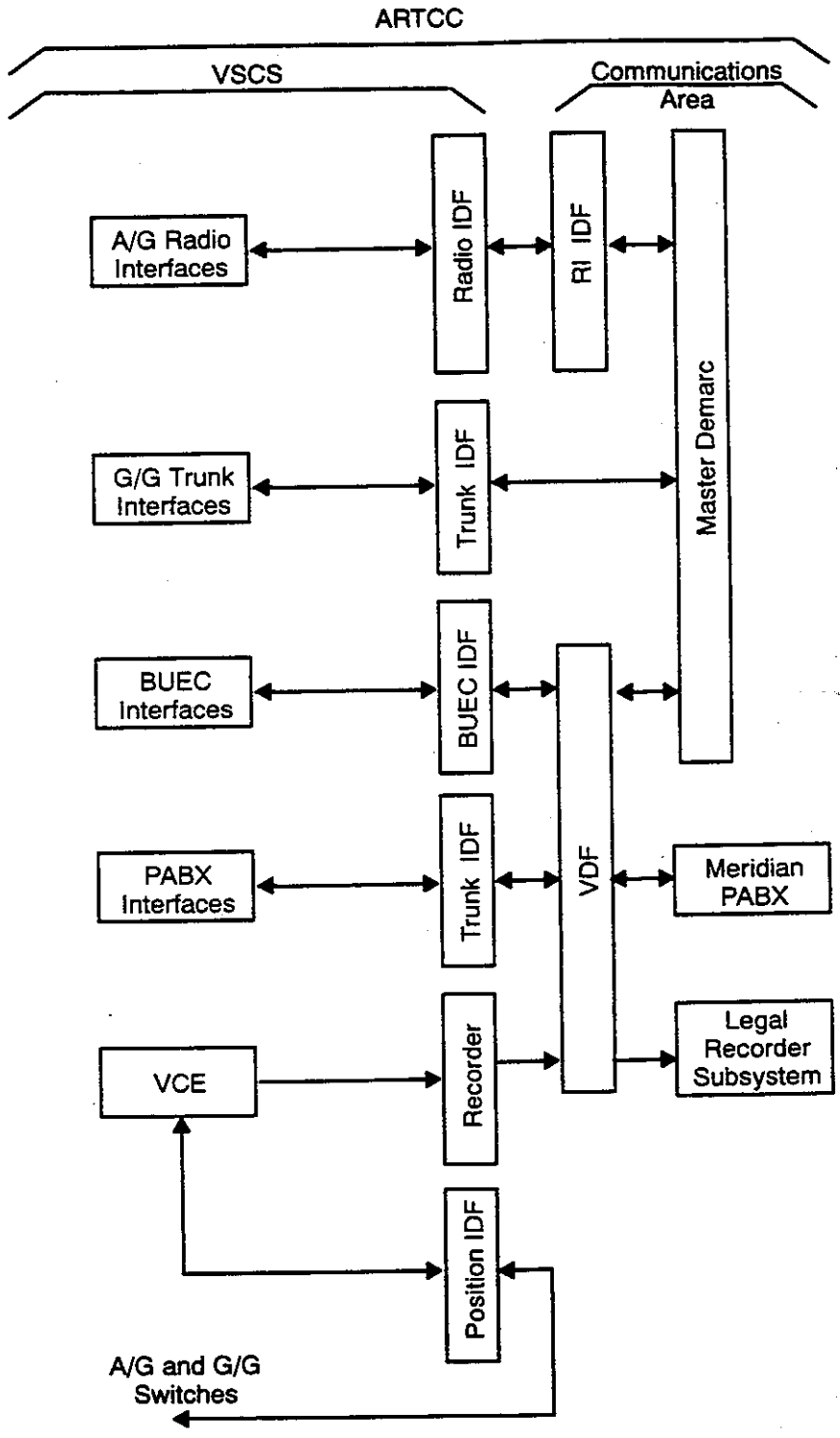


FIGURE 2-4. VSCS IDF RELATIONSHIP

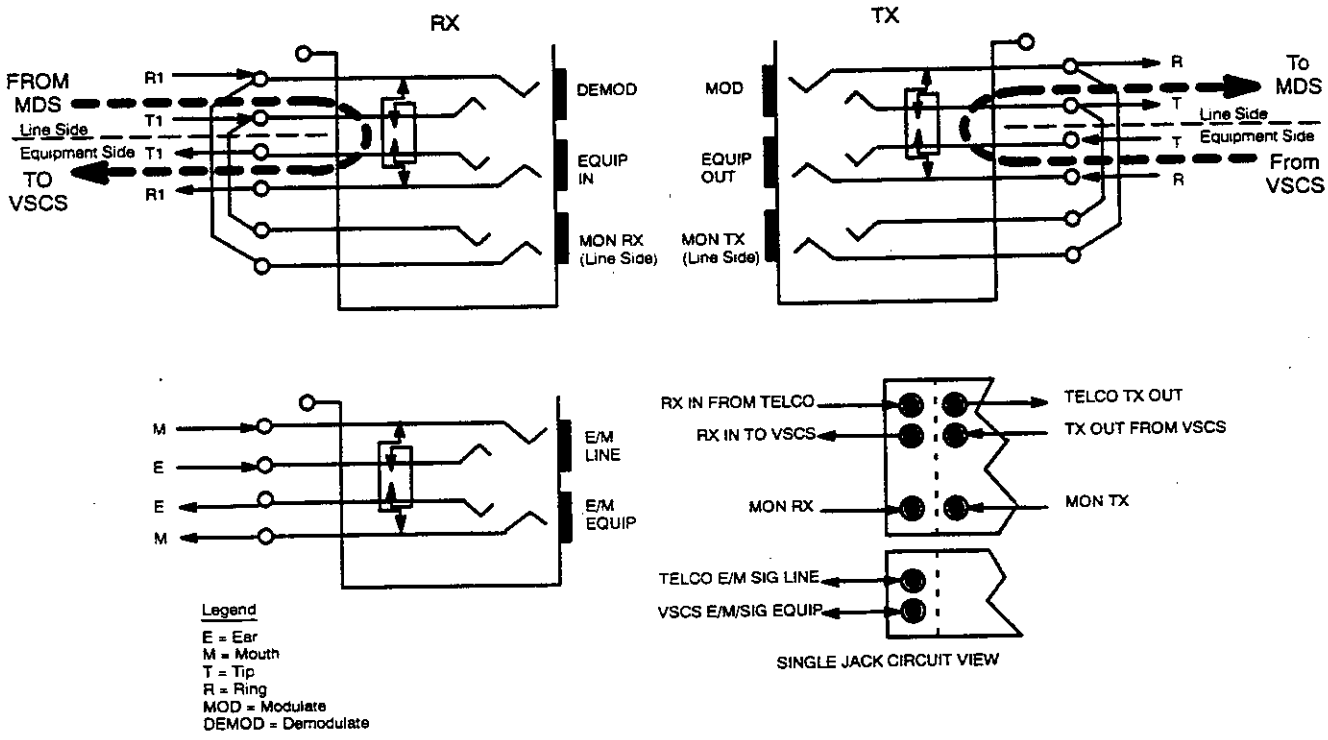
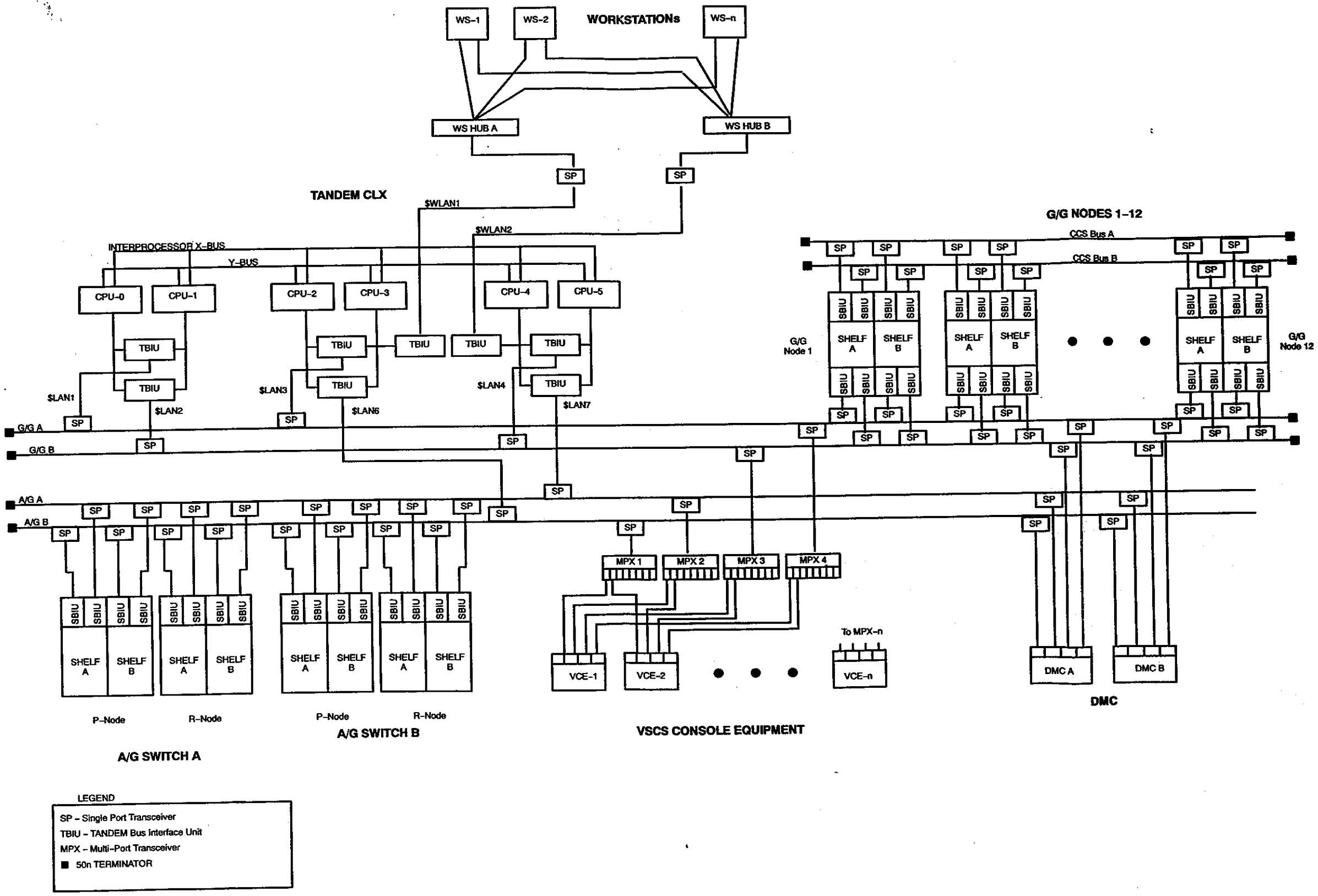


FIGURE 2-5. IDF PATCH PANEL DIAGRAM



LEGEND

SP – Single Port Transceiver
TBIU – TANDEM Bus Interface Unit
MPX – Multi–Port Transceiver
■ 50n TERMINATOR

FIGURE 2–6. BUSLAN EQUIPMENT BLOCK DIAGRAM

c. G/G BusLAN. The G/G bus provides data and control connectivity between the VCE's, DMC's, Tandem CLX, and G/G Switch nodes. The G/G BusLAN consists of A and B redundant buses. Both buses operate in an on-line primary mode.

d. Single-port Transceivers. The single-port transceivers provide single drop connections off of the A/G, G/G, and CCS BusLAN's. The ports are used to connect to multi-port transceivers, VCE's, A/G and G/G switches, DMC's, and Tandem CLX (stations) to the redundant A/G and G/G BusLAN's. The transceivers are clamped to the 802.3 Ethernet Thicknet cable, and connected to its station module via a twisted pair drop cable. The single port transceivers receive power from its station module.

e. Multi-port Transceivers. The multi-port transceivers provide multi-drop fan-out connections (1 to 8) of 8 ports per transceiver unit. Each multi-port unit interfaces to the A/G and G/G BusLAN's through a single port transceiver. The ports are used to connect a group of VCE's to the redundant A/G and G/G BusLAN's. The VSCS multi-port transceiver configuration consist of a set of 4 multi-ports units, per 8 VCE's. Each unit is configured with dual AC power feeds.

f. Ethernet BusLAN Repeater. The Ethernet BusLAN Repeater(s) provides the local area network (LAN) connectivity between VSCS and Display System Replacement (DSR). An Ethernet Repeater is used for each of the four LAN's in VSCS (A/G A, A/G B, G/G A, and G/G B). VSCS follows a BusLAN hardware design in accordance with the IEEE 802.3 Standard. VSCS uses a thick-net application which allows a coaxial cable (BusLAN segment) to be a maximum of 500 meters in length. In order not to exceed this requirement, BusLAN Repeaters are required to accommodate the new DSR BusLAN segment for DSR consoles. The power supply to each Ethernet BusLAN Repeater is dual fed and routed through two independent power paths physically separated to approach the equipment from opposite directions. Power Source "A" supplies Rack Power Strip "A" and directly feeds into A/G LAN A Repeater and G/G LAN A Repeater. Power Source "B" will supply backup power to A/G LAN A Repeater and G/G LAN A Repeater. Power Source "B" supplies Rack Power Strip "B" and directly feeds into A/G LAN B Repeater and G/G LAN B Repeater. Power Source "A" will supply backup power to A/G LAN B Repeater and G/G LAN B Repeater.

32. POWER CONDITIONING SYSTEM (Unit 18).

The power equipment consists of the Liebert Datawave Magnetic Synthesizer, a typical ac power bus, and facility wiring. Power conditioning is accomplished using a magnetic synthesizer. The magnetic synthesizer accepts three-phase, 3W, delta configuration, input power. The magnetic synthesizer also regenerates three-phase, 4W-wye configuration output power, as well as maintaining the phase separation for each leg of the ac power inputs at 120 degrees under all load conditions.

33. SYSTEM INTERCONNECT SUBSYSTEM EQUIPMENT (Unit n/a).

The System Interconnections Subsystem (SIS) provides the cable connectivity of power and signal between all stand-alone cabinets and unit pieces of equipment. This includes the VCE, A/G Switch A, A/G Switch B, G/G Switch, Control System Cabinets, Workstations, Ancillary Cabinet (if present), CTSU (if present), Timing Cabinet, Maintenance Position Consoles, Test Equipment Cabinet, Bus Local Area Network (BusLAN) Transceivers, Intermediate Distribution Frame (IDF) (including Patch Panels), Supervisory Recorders, and Power Conditioners. The physical units of IDF, Patch Panels, transceivers, BusLAN connections, power conditioners as well as the system cables belong to the SIS.

34. CHANNEL EQUIPMENT.

Channel equipment includes all equipment extending beyond the VSCS intermediate distribution frames and is not a part of the VSCS. Refer to Orders 6470.29A, Maintenance of En Route Air-To-Ground Communications Facilities, for channel equipment description.

35. GENERAL COMMUNICATION PATHS.

a. General. The air traffic controller (ATC) communicates through the VCE. Each VCE can be configured to provide A/G and G/G communications interface with the VSCS operator. Signal paths in the VSCS are from the VCE to the Position (IDF). From the IDF to the recipient of the call, the path depends on whether the call involves communicating with an aircraft via an A/G radio, or between facilities or positions within a facility using G/G communications. Figure 2–7, illustrates the VSCS A/G and G/G communications functional block diagram.

b. A/G Communication Path. A/G Communication is provided when the controller

generates a PTT command, which keys the radio and allows the controller to communicate with the aircraft. There are two types of A/G communication paths, ATC Position-to-Aircraft, and Aircraft-to-ATC position.

(1) Controller Position-To-Aircraft. The controller position-to-aircraft path allows audio signals to be transmitted from the ATC over radio or BUEC to the aircraft.

(2) Aircraft-To-Controller. The aircraft-to-controller position path provides standard or emergency radio call signals to the ATC VCE position.

c. G/G Communication Path. G/G Communication consists of two types of calls, intercom and interphone. Intercom calls are made to other positions within the facility. Interphone calls are made between facilities.

(1) Intercom Call. Intercom calls are initiated when the controller accesses a telephony trunk from the VCE. Audio and related control signals are routed through the G/G switch to the called position. When the call is answered, the response audio and control signals are returned over the same circuits.

(2) Interphone Call. Interphone calls are also initiated in a similar fashion to intercom calls. The G/G switch connects the outgoing audio and signals to FAA private automatic branch exchange (PABX) or telephony trunks of the requested facility. When the call is answered, the response audio and control signals are returned over the same circuits. (Refer to TI 6690.19, VSCS System Maintenance Manual, for further call processing information.)

36.–39. RESERVED.

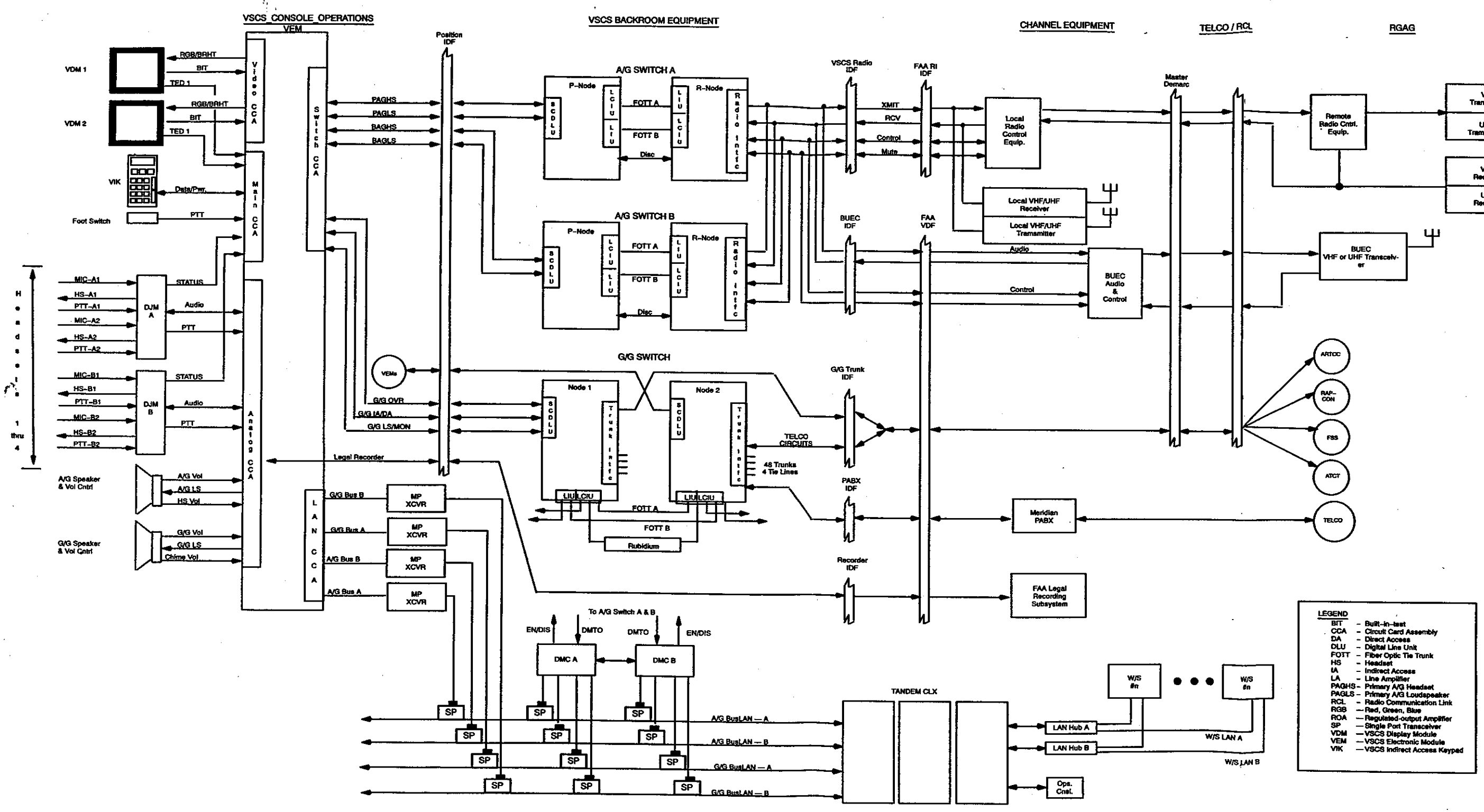


FIGURE 2–7. A/G AND G/G COMMUNICATIONS, SIMPLIFIED BLOCK DIAGRAM

CHAPTER 3. STANDARDS AND TOLERANCES

70. GENERAL.

This chapter prescribes the standards and tolerances for the VSCS equipment as defined and described in Order 6000.15.

All key performance parameters and/or key inspection elements are clearly identified by an arrow placed to the left of the applicable item.

STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
71. VSCS AC POWER				
a. Input Voltage	Par. 124	3 Phase	±3% (6.24 V)	Same as initial
(1) Phase A–B		208 V ac	201.7 to 214.2 V ac Steady State	Same as initial
(2) Phase B–C		208 V ac	201.7 to 214.2 V ac Steady State	Same as initial
(3) Phase C–A		208 V ac	201.7 to 214.2 V ac Steady State	Same as initial
b. Conditioned Output, Liebert	Par. 124			
(1) Voltage			±10% (21/12 V)	Same as initial
(a) Phase X–Y		208 V ac	187 to 229 V ac	Same as initial
(b) Phase Y–Z		208 V ac	187 to 229 V ac	Same as initial
(c) Phase Z–X		208 V ac	187 to 229 V ac	Same as initial
(d) Phase X–N		120 V ac	108 to 132 V ac	Same as initial
(e) Phase Y–N		120 V ac	108 to 132 V ac	Same as initial
(f) Phase Z–N		120 V ac	108 to 132 V ac	Same as initial
(2) Power				
FREQ		60 Hz	±0.5 Hz	Same as initial
72. CONTROL SUBSYSTEM				
a. Tandem CLX				
(1) Temperature	Par. 113			

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(a) Ambient Air		Max 38°C Min 8°C	Same as standard	Same as standard
(b) Exhaust Air		Max 72°C Min N/A	Same as standard	Same as standard
(c) Power Monitor Area Air		Max 55°C Min N/A	Same as standard	Same as standard
(2) Reserved				
(3) Power Supply Differential dc Voltages	Par. 113			
(a) Battery		14.475 V (Max) 13.725 V (Min)	Same as standard	Same as standard
(b) CPU IPS ..... (Interruptible)		5.25 V (Max) 4.9 V (Min)	Same as standard	Same as standard
(c) MEM UPS ..... (Uninterruptible)		5.25 V (Max) 4.9 V (Min)	Same as standard	Same as standard
(d) I/O IPS ..... (Interruptible)		6.4 V (Max) 6.15 V (Min)	Same as standard	Same as standard
(4) Power Supply Ripple dc Voltages	Par. 113			
(a) Battery		0.2 V (Max) (Min N/A)	Same as standard	Same as standard
(b) CPU IPS ..... (Interruptible)		0.1 V (Max) (Min N/A)	Same as standard	Same as standard
(c) MEM UPS ..... (Uninterruptible)		0.1 V (Max) (Min N/A)	Same as standard	Same as standard
(d) I/O IPS ..... (Interruptible)		0.05 V (Max) (Min N/A)	Same as standard	Same as standard
(5) Power Supply Differential Reference dc Voltages	Par. 113			
(a) 0.00 Volt		0.05 V (Max) 0.00 V (Min)	Same as standard	Same as standard
(b) 1.25 Volt		1.3 V (Max) 1.2 V (Min)	Same as standard	Same as standard

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(c) 5.00 Volt		5.05 V (Max) 4.95 V (Min).	Same as standard	Same as standard
(d) 6.25 Volt		6.3 V (Max) 6.2 V (Min)	Same as standard	Same as standard
(6) Power Supply Ripple on Reference dc Voltages	Par. 113			
(a) 0.00 Volt		0.01 V (Max) N/A (Min)	Same as standard	Same as standard
(b) 1.25 Volt		0.01 V (Max) N/A (Min)	Same as standard	Same as standard
(c) 5.00 Volt		0.01 V (Max) N/A (Min)	Same as standard	Same as standard
(d) 6.25 Volt		0.01 V (Max) N/A (Min)	Same as standard	Same as standard
(7) Auxiliary Power Supply dc Voltages	Par. 113			
(a) Battery Loaded		The difference between Battery Differential Voltage reading and Battery Loaded Voltage reading must be: 2.0 V (Max) .5 V (Min).	Same as standard	Same as standard
(b) 12.0 Volt		12.505 V (Max) 11.495 V (Min)	Same as standard	Same as standard
(c) 7.5 Volt		7.6 V (Max) 7.3 V (Min)	Same as standard	Same as standard
(d) 5.7 Volt		5.885 V (Max) 5.615 V (Min)	Same as standard	Same as standard
(e) 5.0 Volt		5.25 V (Max) 4.75 V (Min)	Same as standard	Same as standard
b. DMC				
(1) Power Supply dc ..... Voltages	Par. 114			

STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
(a) +5 Volt		+5.1 V	±.255 V	Same as initial
(b) +14.5 Volt		+14.5 V	±.725 V	Same as initial
→ (2) Operation of DMC A & B with each A/G Switch.	Par. 104	Successful no-fault execution	Same as standard	Same as standard
(3) Manual switchover ..... capability of DMC A & B with each A/G Switch.	Par. 111	Successful no-fault execution	Same as standard	Same as standard
(4) DMC Front Panel Lamps	Par. 115	6–11 ohms	Same as standard	Same as standard
→ (5) DMC diagnostics	Par. 116	Successful no-fault execution	Same as standard	Same as standard
73. SWITCHING SUBSYSTEM (20/20 SWITCH)				
a. A/G & G/G Common Equipment and Single Circuit Shelf Power Supply Output dc Voltages	Par. 117	+5 V	4.7 V min 5.3 V max	Same as initial
		+12 V	11.4 V min 12.6 V max	Same as initial
		−12 V	11.4 V min 12.6 V max	Same as initial
		−5.2 V	4.9 V min 5.5 V max	Same as initial
		−48 V	47 V min 49 V max	Same as initial
		−5 V	4.7 V min 5.3 V max	Same as initial
→ **b. Operation of A/G ..... Switches**	Par. 104	Successful no-fault execution	Same as standard	Same as standard
→ **c. A/G Switches P–Node ..... Shelf Diagnostics**	Par. 118	Successful no-fault execution	Same as standard	Same as standard

STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
→ **d. A/G Switch R-Node Shelf Diagnostics**	Par. 119	Successful no-fault execution	Same as standard	Same as standard
e. A/G Voice Circuits				
(1) Transmit/Receive Audio Levels	Par. 127	Commissioned Values	± 1.5 dB	Same as initial
(a) RCAG VFSS ..... Equipment	Order 6650.4			
(b) BUEC	Order 6650.9			
(c) Local RCAG ..... Equipment	Order 6470.29			
(2) Level Regulation (Receive)	Par. 127	−9 dBm	± 1.5 dB	Same as initial
(3) Frequency Response (AGC Disabled)	Par. 127	−9 dBm reference to 1004 Hz	End-to-End −0.5 dB to +0.6 dB Loopback ± 2.2 dB with 4001A or 4410S	Same as initial
NOTE: (+ = more loss, − = less loss)				
(4) Background Noise	Par. 127	23 dBrnc Maximum	Same as standard	Same as standard
→ **f. Operation of G/G ..... Switches**	Par. 104	Successful no-fault execution	Same as standard	Same as standard
→ **g. G/G Switches Node Shelf Diagnostics**	Par. 120	Successful no-fault execution	Same as standard	Same as standard
h. G/G Voice Circuits ..... Transmission Parameters, Single Circuit E&M Interface Card				
(1) Type 3, 20 Hz Ring Out Trunk, LSO Type 8, Local Dial Line (Tellabs 6131A)	Par. 128 (4-Wire) Par. 130 (2-Wire)			

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(a) Transmit/Receive ..... Levels		−9 dBm	± 1.5 dB	Same as initial
(b) Level Regulation ..... (Receive)		−9 dBm	± 1.5 dB	Same as initial
(c) Frequency Response .. (AGC Disabled)		−9 dBm reference to 1004 Hz	End-to-End −1.75 dB to +4.85 dB	Same as initial
NOTE: (+ = more loss, − = less loss)			Loopback −2.25 dB to +5.35 dB	
(d) Background Noise		23 dBrnc Maximum	Same as standard	Same as standard
(2) Type 3, 20 Hz Ring In Trunk, LSS Type 6, CO/PBX Ext/ Trunk (Tellabs 6131B)	Par. 128 (4−Wire) Par. 130 (2−Wire)			
(a) Transmit/Receive ..... Levels		−9 dBm	± 1.5 dB	Same as initial
(b) Level Regulation ..... (Receive)		−9 dBm	± 1.5 dB	Same as initial
(c) Frequency Response .. (AGC Disabled)		−9 dBm reference to 1004 Hz	End-to-End −1.5 dB to +2.4 dB	Same as initial
NOTE: (+ = more loss, − = less loss)			Loopback −2.0 dB to +2.9 dB	
(d) Background Noise		23 dBrnc Maximum	Same as standard	Same as standard
(3) Type 3, (E&M Ringing/ Loop Trunk, LSO, RD, LSS, RDNS PABX, E&M Same Facility (Tellabs 6131D)	Par. 128			
(a) Transmit/Receive ..... Levels		−9 dBm	± 1.5 dB	Same as initial
(b) Level Regulation ..... (Receive)		−9 dBm	± 1.5 dB	Same as initial

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(c) Frequency Response .. (AGC Disabled)		−9 dBm reference to 1004 Hz	End-to-End −1.5 dB to +1.7 dB	Same as initial
NOTE: (+ = more loss, − = less loss)			Loopback −2.0 dB to +2.2 dB	
(d) Background Noise		23 dBrnc Maximum	Same as standard	Same as standard
(4) Type 3, SF (E&M) Ringing/Loop Tone-on-Active Trunk, RD, RDNS (Tellabs 6047JAM1)	Par. 128			
(a) Transmit/Receive ..... Levels		−9 dBm	± 1.5 dB	Same as initial
(b) Level Regulation ..... (Receive)		−9 dBm	± 1.5 dB	Same as initial
(c) Frequency Response .. (AGC Disabled)		−9 dBm reference to 1004 Hz	End-to-End −1.3 dB to +1.4 dB	Same as initial
NOTE: (+ = more loss, − = less loss)			Loopback −1.8 dB to +1.9 dB	
(d) Background Noise		23 dBrnc Maximum	Same as standard	Same as standard
(5) Type 3, SF (E&M) Ringing/Loop Tone-on-Idle Trunk, TB, RD, LSS, RDNS (Tellabs 6048A)	Par. 128			
(a) Transmit/Receive ..... Levels		−9 dBm	± 1.5 dB	Same as initial
(b) Level Regulation ..... (Receive)		−9 dBm	± 1.5 dB	Same as initial

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(c) Frequency Response .. (AGC Disabled)		−9 dBm reference to 1004 Hz	End-to-End −1.6 dB to +2.6 dB	Same as initial
NOTE: (+ = more loss, − = less loss)			Loopback −2.1 dB to +3.1 dB	
(d) Background Noise		23 dBrnc Maximum	Same as standard	Same as standard
(6) Type 7, DX Trunk PABX, DX Trunk (Tellabs 6131C)	Par. 128			
(a) Transmit/Receive ..... Levels		−9 dBm	± 1.5 dB	Same as initial
(b) Level Regulation ..... (Receive)		−9 dBm	± 1.5 dB	Same as initial
(c) Frequency Response .. (AGC Disabled)		−9 dBm reference to 1004 Hz	End-to-End −1.0 dB to +1.7 dB	Same as initial
NOTE: (+ = more loss, − = less loss)			Loopback −1.5 dB to +2.2 dB	
(d) Background Noise		23 dBrnc Maximum	Same as standard	Same as standard
i. G/G Voice Circuits Transmission Parameters Single Frequency Vox Interface Card	Par. 128			
(1) Type 3, 2600 Hz Tone Burst				
(a) Transmit/Receive ..... Levels		−9 dBm	± 1.5 dB	Same as initial
(b) Level Regulation ..... (Receive)		−9 dBm (+gain or −loss of programmed setup of SF VOX card	± 1.5 dB	Same as initial

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(c) Frequency Response .. (AGC Disabled)		−9 dBm reference to 1004 Hz	End-to-End −0.5 dB to +0.6 dB	Same as initial
NOTE: (+ = more loss, − = less loss)			Loopback ±1.2dB without 4001A or 4410S	
			±2.2 dB with 4001A or 4410S	
(d) Background Noise		23 dBrnc Maximum	Same as standard	Same as standard
(2) Type 4, 4/5, 5 SS1 Signaling				
(a) Transmit/Receive ..... Levels		−9 dBm	± 1.5 dB	Same as initial
(b) Level Regulation ..... (Receive)		−9 dBm (+gain or −loss of programmed setup of SF VOX card	± 1.5 dB	Same as initial
(c) Frequency Response .. (AGC Disabled)		−9 dBm reference to 1004 Hz	End-to-End −0.5 dB to +0.6 dB	Same as initial
NOTE: (+ = more loss, − = less loss)			Loopback ±1.2dB without 4001A or 441	
			±2.2 dB with 4001A or 4410S	
(d) Background Noise		23 dBrnc Maximum	Same as standard	Same as standard
(3) Type 7, SF Signaling.				
(a) Transmit/Receive ..... Levels		−9 dBm	± 1.5 dB	Same as initial
(b) Level Regulation ..... (Receive)		−9 dBm (+ gain or — loss of programmed set-up of SF VOX card	± 1.5 dB	Same as initial

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(c) Frequency Response .. (AGC Disabled)		−9 dBm reference to 1004 Hz	End-to-End −0.5 dB to +0.6 dB	Same as initial
NOTE: (+ = more loss, − = less loss)			Loopback ±1.2dB without 4001A or 4410S ±2.2 dB with 4001A or 4410S	
(d) Background Noise		23 dBrnc Maximum	Same as standard	Same as standard
(4) Type 9, Voice Call.				
(a) Transmit/Receive ..... Levels		−9 dBm	± 1.5 dB	Same as initial
(b) Level Regulation ..... (Receive)		−9 dBm (+ gain or — loss of programmed set-up of SF VOX card	± 1.5 dB	Same as initial
(c) Frequency Response (AGC Disabled)		−9 dBm reference to 1004 Hz	End-to-End −0.5 dB to +0.6 dB	Same as initial
NOTE: (+ = more loss, − = less loss)			Loopback ±1.2dB without 4001A or 4410S ±2.2 dB with 4001A or 4410S	
(d) Background Noise		23 dBrnc Maximum	Same as standard	Same as standard
(5) Type 20, VSCS to VSCS.				
(a) Transmit/Receive Levels		−9 dBm	± 1.5 dB	Same as initial
(b) Level Regulation (Receive)		−9 dBm (+ gain or — loss of programmed set-up of SF VOX card	± 1.5 dB	Same as initial

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(c) Frequency Response (AGC Disabled)		−9 dBm reference to 1004 Hz	End-to-End −0.5 dB to +0.6 dB	Same as initial
NOTE: (+ = more loss, − = less loss)			Loopback ±1.2dB without 4001A or 4410S ±2.2 dB with 4001A or 4410S	
(d) Background Noise		23 dBrnc Maximum	Same as standard	Same as standard
(6) PABX, 4−Wire SF Signaling, Different Facility.				
(a) Transmit/Receive Levels		−9 dBm	± 1.5 dB	Same as initial
(b) Level Regulation (Receive)		−9 dBm (+ gain or — loss of programmed set-up of SF VOX card	± 1.5 dB	Same as initial
(c) Frequency Response (AGC Disabled)		−9 dBm reference to 1004 Hz	End-to-End −0.5 dB to +0.6 dB	Same as initial
NOTE: (+ = more loss, − = less loss)			Loopback ±1.2dB without 4001A or 4410S ±2.2 dB with 4001A or 4410S	
(d) Background Noise		23 dBrnc Maximum	Same as standard	Same as standard
j. Timing Equipment				
(1) Rubidium Frequency Standard	Par. 126			
(a) Control Voltage		> +5 < +40	Same as standard	Same as standard
(b) Rubidium Lamp ..... Range		Black portion of meter scale	Same as standard	Same as standard
(c) dc Supply		Black portion of meter scale	Same as standard	Same as standard

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(d) Charge Current		0 to +5	Same as standard	Same as standard
(e) Battery Condition		Black portion of meter scale	Same as standard	Same as standard
(2) Reserved				
74. VSCS CONSOLE EQUIPMENT (VCE)				
a. VEM Power Supply dc Output Voltages	Par. 200			
(1) +5 Volt		+ 5 V	± .14 V	Same as initial
(2) +15 Volt		+1 5 V	± .45 V	Same as initial
(3) −15 Volt		−15 V	± .45 V	Same as initial
(4) +24.2 Volt		+24.2 V	± .968V	Same as initial
(5) +13.75 Volt		+13.75 V	± .6875V	Same as initial
b. Recording Equipment				
Transmission level regulation to legal recorders	Par. 129	−10 dBm	± 1.5 dB	Same as initial
75.−79. RESERVED				

CHAPTER 4. PERIODIC MAINTENANCE

80. GENERAL.

This chapter establishes all the maintenance activities that are required for the VSCS on a periodic, recurring basis and the schedules for their accomplishment. This chapter is divided into two sections. Section 1, Performance Checks, identifies the performance checks (i.e., test, measurements, and observations) of normal operating controls and functions, which are necessary to determine whether operation is within established tolerance/limits. The section 2, Other Maintenance Tasks, identifies other tasks that are necessary to prevent deterioration and/or ensure reliable operation. Refer to Order 6000.15, for additional guidance.

Section 1. PERFORMANCE CHECKS

Performance Checks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
81. DAILY		
a. Control Subsystem		
(1) Check Event Message Monitor (EMM) for normal. operation. (Lack of Event messages, Faults and element Failures).	Normal Operation	Par. 103
(2) Verify proper operation of DMC A & B with each A/G Switch.	72b(2)	Par. 104
(3) Check status on all Tandem CLX devices using... PUP LISTDEV command.	Comparison with as commissioned extracted data	Par. 105
(4) Check status on all Tandem CLX processes using. STATUS and PPD commands.	Comparison with as commissioned extracted data	Par. 105
(5) Check Tandem CLX OPRLOG	Comparison with as commissioned extracted data	Par. 105
b. Switching Subsystem.		
(1) Verify proper operation of both A/G Switches.....	Par. 73b	Par. 104
(2) Verify proper operation of all G/G Switch Nodes..	Par 73f	Par. 104
82. WEEKLY		
a. Switching Subsystem		
(1) Check Radio Interface Card fuse LED's	Visual Inspection	Par. 106
(2) Check A/G and G/G switch power supply LED's.. and PCC indicators	Visual Inspection	Par. 186
b. Reserved		
83. MONTHLY		
a. Control Subsystem		
(1) Check alternate paths to Tandem CLX disk drives	Functional Check	Par. 107
(2) Check track data on Tandem disk volumes	Functional Check	Par. 108
(3) Check Tandem CLX LED's	Visual Check	Par. 109
(a) Logic Boards.		

Section 1. PERFORMANCE CHECKS

Performance Checks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
(b) Memory Boards.		
(c) I/O Boards.		
(d) Power Supplies.		
(4) Verify proper operation of redundant workstation LAN's	Functional Check	Par. 110
(5) Verify DMC manual switchover capability with each A/G switch.	Par. 72b(3)	Par. 111
b. Switching Subsystem		
Verify A/G switch standby radio interface cards	Functional Check	Par. 112
84. QUARTERLY		
a. Control Subsystem		
(1) Check Tandem CLX Air Temperature	Par. 72a(1)	Par. 113
(2) Reserved		
(3) Check Tandem CLX Power Supply Battery Voltage	Par. 72a(3)(a)	Par. 113
(4) Check Tandem CLX CPU IPS Voltage	Par. 72a(3)(b)	Par. 113
(5) Check Tandem CLX MEM UPS Voltage	Par. 72a(3)(c)	Par. 113
(6) Check Tandem CLX I/O IPS Voltage	Par. 72a(3)(d)	Par. 113
(7) Check Tandem CLX Power Supply Battery Ripple Voltage.	Par. 72a(4)(a)	Par. 113
(8) Check Tandem CLX CPU IPS Ripple Voltage	Par. 72a(4)(b)	Par. 113
(9) Check Tandem CLX MEM UPS Ripple Voltage	Par. 72a(4)(c)	Par. 113
(10) Check Tandem CLX I/O IPS Ripple Voltage	Par. 72a(4)(d)	Par. 113
(11) Check Tandem CLX Power Supply Reference Voltages	Par. 72a(5) and (6)	Par. 113
(12) Check Tandem CLX Auxiliary Power Supply	Par. 72a(7)	Par. 113
(13) Measure DMC Power Supply Voltage	Par. 72b(1)	Par. 114
(14) Check Continuity of DMC Front Panel Lamps	Par. 72b(4)	Par. 115
(15) Run DMC Diagnostics	Par. 72b(5)	Par. 116

Section 1. PERFORMANCE CHECKS

Performance Checks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
b. Switching Subsystem		
(1) Check A/G and G/G switch power supply LED's, voltages, and PCC indicators.	Par. 73a and Visual Inspection	Par. 117
(2) Run A/G Switch P–Node Shelf Diagnostics	Par 73c	Par. 118
(3) Run A/G Switch R–Node Shelf Diagnostics	Par. 73d	Par. 119
(4) Run G/G Switch Shelf Diagnostics	Par 73g	Par. 120
c. Position Equipment (VCE)		
Reserved		
d. System Interconnect Subsystem		
(1) Check Single Port Transceiver LED's	Visual Inspection	Par. 121
(2) Check Multiport Transceiver LED's	Visual Inspection	Par. 122
(3) Check Workstation LAN Hubs and Single Port Transceivers.	Visual Inspection	Par. 123
e. VSCS AC Power		
Check Power Conditioning System Display Panel Indications.	Par. 71	Par. 124
85. SEMIANNUALLY		
a. Control Subsystem		
Check Tandem CLX Interprocessor X/Y Busses Status.	Functional Check	Par. 125
b. Switching Subsystem		
Check Rubidium Frequency Standard	Par. 73j(1)	Par. 126
86. ANNUALLY		
a. Switching Subsystem		
(1) Measure A/G Voice Transmission Parameters	Par. 73e	Par. 127
(2) Measure G/G Voice Transmission Parameters	Par. 73h and i	Par. 128
(3) Measure Transmission Level Regulation To Legal Recorders.	Par. 74b	Par. 129
(4) Measure G/G Two-Wire Transmission Parameters	Par. 73h and i	Par. 130

Section 1. PERFORMANCE CHECKS

Performance Checks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
b. Power Conditioning System		
Inspect Liebert Power Conditioner	Functional Check	Liebert Datawave Installation, Operation and Maintenance Manual Section 3 & 5
87.–89. RESERVED		

Section 2. OTHER MAINTENANCE TASKS

Maintenance Checks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
90. DAILY		
None		
91. WEEKLY		
None		
92. MONTHLY		
a. Control Subsystem		
(1) Check print quality and clean paper dust from .. High Speed printer.	Visual Inspection	Par. 170
(2) Reserved		
(3) Check print quality and clean paper dust from .. all workstation printers.	Visual Inspection	Par. 172
(4) Check Tandem CLX tape drive and disk drive... cooling fans.	Visual check	Par. 173
(5) Check Tandem CLX cabinet and CPU Power..... Supply cooling fans.	Visual check	Par. 174
(6) Check and replace Tandem CLX system air filters in cabinet doors.	Visual check	Par. 175
(7) Back up Tandem CLX OLDLOG to cartridge..... tape	File backed up on magnetic tape periodically	Par. 176
(8) Clean Tandem CLX cartridge tape drive.....	Cleaning and visual	Par. 177
b. Switching Subsystem		
(1) Check A/G, G/G, and FOTT cabinet cooling fans. and air filters.	Visual Inspection	Par. 178
(2) Check Test Equipment Rack Assembly cabinet... cooling fans and air filter.	Visual Inspection	Par. 179
(3) Check Timing Equipment Rack Assembly cabinet cooling fans and air filter.	Visual Inspection	Par. 180
(4) Check Ancillary Rack Assembly cabinet cooling .. fans and air filter.	Visual Inspection	Par. 181
c. Position Equipment (VCE)		
Check VEM cooling fan and air filter	Visual Inspection	Par. 182

Section 2. OTHER MAINTENANCE TASKS

Maintenance Checks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
d. System Interconnect Subsystem		
Check DSR multiport transceiver cabinet air filter....	Visual Inspection	Par. 185
93. QUARTERLY		
None		
94. SEMIANNUALLY		
Control Subsystem		
(a) Back up all files on system	All files backed up on magnetic tape periodically	Par. 183
(b) Clean Supervisory recorder tape heads.....	Cleaning and visual	Par. 184
95. ANNUALLY		
None		
96.–99. RESERVED		

CHAPTER 5. MAINTENANCE PROCEDURES

100. GENERAL.

a. This chapter establishes the procedures for accomplishing the various essential maintenance activities which are required for the VSCS, on either a periodic or incidental basis. The procedures contained herein are those that cannot be found in the equipment instruction books.

b. The first section describes the procedures to be used in making the performance checks listed in Chapter 4, Periodic Maintenance, Section 1, Performance Checks. The second section describes the procedures for doing the tasks listed in Chapter 4, Section 2, Other Maintenance Tasks. The third section describes the procedures for doing special tasks, usually non-scheduled and not listed in Chapter 4. Refer to Order 6000.15, for additional guidance.

101. TEST EQUIPMENT.

Test equipment generally available to field facilities is listed in Table 5−1. The generic name is followed by a preferred item and a substitute item. The latter is expected to perform satisfactorily if the preferred item is unavailable.

TABLE 5−1. TEST EQUIPMENT LISTING

Generic Name	*Preferred Item*	*Substitute Item*
a. TIMS.	Ameritec, Model AM5XT	Hewlettt Packard, Model 4945A
b. Test Access System.		
Control Unit.	Ameritec, Model AM6	
Line Access Unit.	Ameritec, Model AM6−5	
c. DJM BreakOut Box (BOB)/Loopback Fixture.	Harris Corp. Model 206451−G01	
d. Digital Volt-ohm Milliammeter (VOM).	Fluke Model 45	Fluke Model 77
e. Wrist Strap Tester.	3M 745	
f. Call Analyzer	Ameritec, Model AM8a PEM/VF	

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Line Access Unit.	Ameritec, Model AM6−5	
c. DJM BreakOut Box (BOB)/Loopback Fixture.	Harris Corp. Model 206451−G01	
d. Digital Volt-ohm Milliammeter (VOM).	Fluke Model 45	Fluke Model 77
e. Wrist Strap Tester.	3M 745	
f. Call Analyzer	Ameritec, Model AM8a PEM/VF	

Section 1. PERFORMANCE CHECK PROCEDURES

102. SYSTEM PERFORMANCE ENTRIES.

Refer to TI 6030.1, User's Manual for the Maintenance Management System (MMS), for guidance and instruction.

103. CHECK EVENT MESSAGE MONITOR (EMM) FOR NORMAL SYSTEM OPERATION.

a. Object. To verify normal operation of the system.

b. Discussion. The review of the EMM output is required on a daily basis for normal system operation.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure. Site personnel should select a standard time within each 24-hour period to review all EMM output for the last 24-hour period for system analysis. Accessing the EMM help menu will give instructions on viewing log files or printing a time range for review. If the output identifies any events that need more detail, print the maintenance log for that time period.

104. SYSTEM VERIFICATION TESTS.

a. Object. To verify that the VSCS primary and backup equipment is fully operational and available to provide its advertised service to the users. Verification is performed by mode transitioning A/G and G/G elements through primary and stand-by modes.

b. Discussion. VSCS critical assets that can be configured together to provide A/G and G/G services will be verified to be capable of operating in the online primary mode on a daily basis. This procedure utilizes the Automatic Verification Process (AVP) to transition A/G, and G/G elements in a controlled manner to enable the online BIT to detect faults that cannot be detected while assets are not in the online primary mode. Mode transitions and A/G switchovers will be performed on the following elements during this procedure:

Verification Elements

A/G P-node common equipment (CE) shelves
A/G R-node CE shelves
A/G FOTTs
DMC A & B
G/G CE shelves
G/G FOTTs

c. Test Equipment Required. None.

d. Conditions. Maintenance personnel should be familiar with the current version of the operational program, equipment configuration, and operating instructions of the facility. This procedure should be performed during low traffic periods and must be coordinated with Air Traffic. During the 100 millisecond window when a G/G shelf is being transitioned, calls that are not active (i.e., ringing, in ring back, on hold, or incomplete dialing, etc.) will be torn down and will have to be reinitiated by the user. No impact to A/G communications should occur.

e. Detailed Procedure. Refer to TI 6690.19, System Maintenance Manual (SMM), Section 6 Maintenance Procedures, for procedures on mode transition, A/G switchover, and additional information on the use of AVP.

(1) Confirm that all Verification Elements are either in the online primary or online standby mode. Failed or degraded Verification Elements should be de-selected on the AVP screen and marked as skipped.

NOTE: Test initiation may be undertaken if non Verification Elements (i.e., radio, trunk, VCE's) are off-line failed or degraded.

(2) Confirm that Verification Elements match on their respective day configuration, as listed in the Equipment Rotation tables 5–2 and 5–3. The matched configuration should be the previous day's configuration. If the A/G or G/G switch elements do not match, (e.g., due to failures, maintenance activities over the past 24 hours) perform the required mode transitions and/or A/G switchover to return to the previous day's configuration.

(3) At the Summary Status screen, click on Screen then AVP from the pull down menu. At the AUTOMATIC VERIFICATION PROCESS screen, make any necessary changes and then select the START button.

(4) When the AVP session has completed, perform the required A/G "Additional Steps" as indicated in Table 5-2, and perform the required G/G "Additional Steps" (if any) as indicated in Table 5-3, to complete the transition to the next day configuration. This will result in all A/G critical elements and paths being used during the peak traffic periods at least once every 8 days and all G/G critical elements and paths being used during the peak traffic periods at least once every 4 days.

(5) An AVP report may be printed. At the Summary Status screen, select Screen, then AVP from the pull down menu, and then reports from the AVP screen. An AVP report may also be requested from the Summary Status Screen by selecting Rprt, then AVP from the pull down menu. The Step-by-Step report will be the last time an AVP session was run from the workstation requesting the report. The LE Status report will be the current configuration of the system, regardless of which workstation requests the report.

105. CHECK TANDEM CLX OPERATING SYSTEM.

a. Object. To determine that the GUARDIAN operating system is functioning correctly and that all hardware is operational.

b. Discussion. This procedure performs a status check on all devices, processors, and processes.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Log on to the Tandem OPS console as SUPER.STARTUP.

(2) Enter the following command:

RUN $DATA5.MAINT.DAILY <enter>

(3) Verify that the printed output shows no DOWN or INACCESSIBLE line devices and that all processors and BACKUP processes are executing normally.

TABLE 5-2. VSCS EQUIPMENT ROTATION CHART AIR TO GROUND SWITCH

	VERIFICATION ELEMENTS				
Day Config.	Primary A/G Switch	P&R Node CE Shelf	A/G FOTT	DMC	Additional Steps
1	A	A	A	A	DMC mode transition
2	B	B	B	B	A/G A & B FOTTs, DMC mode transition
3	A	A	B	A	DMC mode transition
4	B	B	A	B	A/G A & B FOTTs, DMC mode transition A/G SWOV
5	B	A	A	A	DMC mode transition
6	A	B	B	B	A/G A & B FOTTs, DMC mode transition
7	B	A	B	A	DMC mode transition
8	A	B	A	B	A/G A & B FOTTs, DMC mode transition A/G SWOV
	(back to day 1 configuration)				

TABLE 5-3. VSCS EQUIPMENT ROTATION CHART GROUND TO GROUND SWITCH

	VERIFICATION ELEMENTS		
Day Config.	All Node CE Shelves	G/G FOTT	Additional Steps
1	A	A	none
2	B	B	G/G FOTT mode transition
3	A	B	none
4	B	A	G/G FOTT mode transition
	(back to day 1 configuration)		

106. INSPECT RADIO INTERFACE CARD FUSE LED'S.

a. Object. To ensure that there are no Pwr Alm LED's lit on the A/G radio interface cards.

b. Discussion. This Grim, Intellect, and Local Radio equipment supplies a dc voltage to the VSCS radio interface cards. There is a fuse on each card. If the fuse is defective, it is not reported to the NOM/maintainer workstation. The only indication is a lit red LED on the radio card. The LED's are located on the front edge of the card and labeled as follows:

Radio Card	LED	Designation	dc Voltage
GRIM	DS4	ALARM	+12 V
Intellect	DS4	ALARM	+5 V
Local Radio	DS4	+48V ALM	+48 V

NOTE: The alarm LED's on GRIM radio cards used for DYSIM are an exception to this; they may or may not be lit.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at anytime.

e. Detailed Procedure.

(1) Open R-Node cabinet front door.

(2) Inspect all Grim, Intellect, and Local Radio circuit cards in the cabinet for a lit red LED. The LED should not be lit.

(3) Close cabinet door.

(4) Repeat this procedure for all R-Node cabinets in the system.

107. CHECK ALTERNATE PATHS TO TANDEM CLX DISK DRIVES.

a. Object. To verify alternate paths to CLX disk drives are functioning properly.

b. Discussion. This procedure will use the PUP PRIMARY and PUP LISTBAD commands to switch primary/backup CPU/path assignments and test each path for proper operation.

c. Test Equipment Required. None.

d. Conditions. This procedure should be performed only when there is no critical system activity is occurring.

e. Detailed Procedure.

(1) Log on to the Tandem OPS console as SUPER.STARTUP.

(2) Type one of the following commands:

RUN $DATA5.MAINT.PATH <enter>
(results to screen)

RUN $DATA5.MAINT.PATH /OUT $S/
<enter> (results to printer)

(3) Evaluate the results to determine if there are any bad paths.

108. CHECK TRACK DATA ON TANDEM CLX DISK VOLUMES.

a. Object. To check for disk tracks listed as bad and to verify that any bad tracks are also assigned spares.

b. Discussion. None.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at anytime.

e. Detailed Procedure.

(1) This procedure will utilize the following PUP commands:

LISTBAD
LISTFREE
LISTDEV

(2) Log on to the Tandem OPS console as SUPER.STARTUP.

(3) Enter the following command:

RUN $DATA5.MAINT.PACK <enter>

(4) Evaluate the output listing to determine if there are any bad tracks and if so; they should be spared using the SPARE command. Refer to the Tandem Peripheral Utility Program, (PUP), Reference manual for use of the SPARE command. Process activity can interfere with the SPARE option and cause data inconsistencies. Refer to the Tandem Peripheral Utilities Program (PUP) Reference manual for use of the SPARE command.

CAUTION: You should stop all processing on the volume when sparing a sector.

109. CHECK TANDEM CLX LED'S.

a. Object. To verify that no alarm or warning lights are illuminated on the following units: System control panel, Cartridge tape unit, Disk drive units, Logic boards, Power supplies, and Backplane Interconnect Cards (BIC).

b. Discussion. The red and green LED's indicate the operational condition of a device. In general, a green light indicates the unit is functioning properly; a red light is a warning that the unit should be restarted or replaced.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Open all front cabinet doors and check for a lit green LED on all disk drives, logic boards, and power supplies. In cabinet 1 only, check for a lit green LED on control panel on inside of cabinet door near door lock.

(2) Remove back covers and check for a lit green LED on all BIC's.

(3) Replace back covers and close front cabinet doors.

110. CHECK WORKSTATION LAN'S.

a. Object. To verify that all workstation LAN cards, LAN cables, and Hub ports are functional.

b. Discussion. Workstation LAN A will be Mode transitioned to MNT mode which will force all workstations to operate on LAN B. If any of the workstation LAN cards, cables, or hub ports are defective a workstation will transition to DEG. If no failures, LAN A is returned to service and LAN B is mode transitioned to MNT mode to verify LAN A. The maintainer workstation should be changed to the opposite LAN to verify both LAN's are functional before performing this procedure.

c. Test Equipment Required. None.

d. Conditions. THIS PROCEDURE MUST BE COORDINATED WITH AIR TRAFFIC. It may interrupt activities at a workstation if failures occur.

e. Detailed Procedure. Log on as maintainer and proceed as follows:

(1) At Summary Status screen, click on Util then Switch to Wkstn Bus [X] to verify both LAN's are functional.

(2) At Summary Status screen, double click on Control Subsystem.

(3) At Control Subsystem Logical Unit Status screen, click on Bus Intfcs.

(4) At Control Subsystem Bus Intfcs Status screen, click on Wkstn Bus A WKSTN INTFC.

(5) Click on Mode.

(6) Click on Offline-Maintenance from the pull down menu, then OK button.

NOTE: A message may appear indicating Communication to Control Subsystem has been lost. This is normal and will clear when communication to the workstation is reestablished.

(7) At Control Subsystem Logical Unit Status screen, click on WORKSTATION.

(8) After approximately 5 minutes, verify that all workstations are still in Pri mode. Any failures will transition a workstation to DEG mode.

(9) If there are no failures at Control Subsystem Logical Unit Status screen, click on BUS INTFCS.

(10) Click on BUS INTFC that is in MNT mode.

(11) Click on Verif pull down menu then "Rtn Svc", OK, and Escape buttons to return the Bus Intfc to PRI mode.

(12) Repeat par 110e, steps (1) through (11) for WKSTN BUS B.

(13) When this procedure is complete, a minimum of two workstations must be switched to WKSTN BUS B for proper detection of HUB/BUS failure.

111. VERIFY DMC MANUAL SWITCHOVER CAPABILITY WITH A/G SWITCH.

a. Object. To verify the ability of each DMC to perform a manual mode transition and a manual A/G switchover.

b. Discussion. DMC A is located in Test Equipment Rack cabinet 1A5 and DMC B is located in Timing Equipment Rack cabinet 6A1.

c. Test Equipment Required. None.

d. Conditions. This procedure should be performed during a low traffic period.

e. Detailed Procedure.

(1) Open equipment cabinet front door of the STANDBY DMC.

(2) On the front panel of the DMC push the Remote/Local button. The button lamp will flash red then remain steady red indicating local mode.

(3) Press the DMC Control Primary button to change the DMC to primary mode. The primary button lamp will flash then remain steady indicating primary mode.

(4) Press the A/G Switchover Control Switch A or Switch B button, whichever one is not lit, to execute an A/G switchover.

(5) Press Remote/Local button to return the DMC to remote mode. The button lamp will flash green then remain steady green indicating remote mode.

(6) Close equipment cabinet door.

(7) Repeat par 111e, steps (1) through (6) for the other DMC.

112. VERIFY A/G SWITCH STANDBY RADIO INTERFACE CARDS.

a. Object. To verify that the standby radio interface cards are functional.

b. Discussion. Exercise caution when changing radio interface cards from standby mode to primary mode so as not to interfere with normal operations. All standby radio interface cards in each A/G switch will be mode transitioned to online primary mode.

c. Test Equipment Required. None.

d. Conditions. This procedure should be done during a period of low traffic to minimize any interruptions in service.

e. Detailed Procedure. Log on as maintainer and proceed as follows:

(1) At Summary Status screen, double click on the primary A/G switch.

(2) At A/G Switch Logical Unit Status screen, click on RADIO INTFC.

(3) Starting with the first page of 24 radio interface cards, mode transition each STBY interface card to Online-Primary.

(4) Continue with each page of 24 interface cards to mode transition the standby interface cards to primary.

(5) Click on Screen then Summary Status from the pull down menu.

(6) At Summary Status screen, double click on the standby A/G switch.

(7) Repeat par 112e, steps (2) through (4) for the standby A/G switch.

113. CHECK TANDEM CLX PMM ENVIRONMENT.

a. Object. To ensure that Tandem power supplies are functioning properly.

b. Discussion. This procedure will give you information as to the status of the Power Maintenance Monitors (PMM) in the system.

(1) The values for the speed and voltage of the fans are information only. The fan speed and voltage are dependent on the temperature of the cabinet and will be adjusted by the Tandem if the temperature changes. If the PMM's in the same cabinet put out two different fan voltages, the fans will respond to the higher voltage. In this case one PMM may report a lower speed (i.e. slow speed) and the other PMM report a higher speed (i.e. medium speed). This is normal.

(2) When checking the battery loaded voltage, note the following:

(a) If the difference between battery differential voltage & battery loaded voltage is less than .5 V, the battery test circuit failed.

(b) If the difference between battery differential voltage & battery loaded voltage is greater than 2.0 V, the battery is bad or not charged.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Log on to the Tandem OPS console as SUPER.STARTUP.

(2) Type: TMDS MDS

(3) Type: LOG $DATA5.TEST.PMMLOG

(4) Type: TIME

(5) Type: ENV

(6) Type: STATUS ENVIRONMENT, PMM [nn]

[nn] = the number of the PMM being tested.

PMM 00 is for CPU 0
PMM 01 is for CPU 1
PMM 02 is for CPU 2
PMM 03 is for CPU 3
PMM 04 is for CPU 4
PMM 05 is for CPU 5

(7) Repeat par 113e, step (6) for all PMM's in the system.

(8) Type: LOG STOP

(9) Type: EXIT (returns you to TACL prompt)

(10) Type: PRINT $DATA5.TEST.PMMLOG

(11) Type: FUP PURGE $DATA5.TEST.PMMLOG (deletes file)

(12) Verify the results for pars 84a(1) through (12) with values in Chapter 3, Standards & Tolerances.

114. CHECK DMC POWER SUPPLIES.

a. Object. To verify that the DMC power supplies are operating properly.

b. Discussion. One DMC is located in the Test Equipment Rack Assembly cabinet 1A5. The other DMC is located in the Timing Equipment Rack Assembly cabinet 6A1.

c. Test Equipment Required. Digital volt-ohm meter (VOM).

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Open cabinet front door and check for a lit green indicator on AC Power Bus A and AC Power Bus B.

(2) Check for lit indicators on two power supplies at the bottom of the cabinet.

(3) Using a digital VOM connect black probe to test point TP 10, (GND), and red probe to the following test points on front panel of DMC and measure the actual voltages:

TP2 +5 V dc
TP8 +14.5 V dc

NOTE: TP 5, +15 V dc, is present but not used.

(4) Close cabinet front door.

(5) Repeat par 114e, steps (1) through (4) for the other DMC.

115. CHECK CONTINUITY OF DMC FRONT PANEL LAMPS.

a. Object. To verify that the front panel lamps are functional on both DMC's.

b. Discussion. The REMOTE/LOCAL, A/G SWITCHOVER CONTROL SWITCH A & SWITCH B, and DMC CONTROL PRIMARY front panel lamp switch assembly will be removed and the lamps checked for continuity. Refer to System Maintenance Manual TI 6690.19 paragraph 7.4.1.12A.4. for more information

c. Test Equipment Required. Digital Volt-Ohm Meter (VOM).

d. Conditions. The DMC under test must be in the Offline-Maintenance mode.

e. Detailed Procedure.

(1) Log on as maintainer and proceed as follows:

(2) At Summary Status screen, double click on Control Subsystem.

(3) At Control Subsystem Logical Unit Status Screen, click on STBY DMC.

(4) Click on Mode, then Offline-Maintenance from the pull down menu.

(5) Click on "OK" button in MODE CHANGE WARNING box.

(6) Click on "Escape" button when mode change is completed.

(7) At DMC in maintenance mode, verify the OFF-LINE indicator is illuminated and the DMC CONTROL PRIMARY indicator is extinguished.

(8) Remove one of the indicator lamp switch assemblies from the lamp switch housing on the DMC front panel by grasping the indicator lens on both sides and pulling straight out.

(9) Swing the lens down taking care not to damage the hinges. Refer to figure 5-1 (side view) for proper lens position

NOTE: Four lamps are installed in each lens assembly. Two for the top half and two for the bottom half. If the lens has dual function (REMOTE/LOCAL), two lamps illuminate the top and the other two illuminate the bottom. If the indicator is a single function (SWITCH A, SWITCH B, PRIMARY) all four lamps are illuminated at the same time.

(10) Check the installed lamp for continuity by measuring the resistance of each lamp between the center contact of the lamp and the land that contacts the side of two lamps. The lamps will have a resistance between 6 and 11 ohms. If any lamp reads open, (i.e. no reading on meter), it is defective and should be replaced. Refer to figure 5-1 (front view) for lamp locations.

(11) Re-install the switch lamp assembly in the housing by aligning the lens assembly with the switch housing and gently pushing the lens into the switch until the switch latch engages.

NOTE: The lens assembly can be installed into the switch housing without activating the switch. When the lens is pressed into the switch, less pressure is required to seat the lens assembly than tripping the action of the switch.

(12) Repeat steps 8 through 11 for other DMC lamp assemblies.

(13) When all lamps have been tested, perform verification testing procedure in 6690.3, Section 5, Paragraph 116.

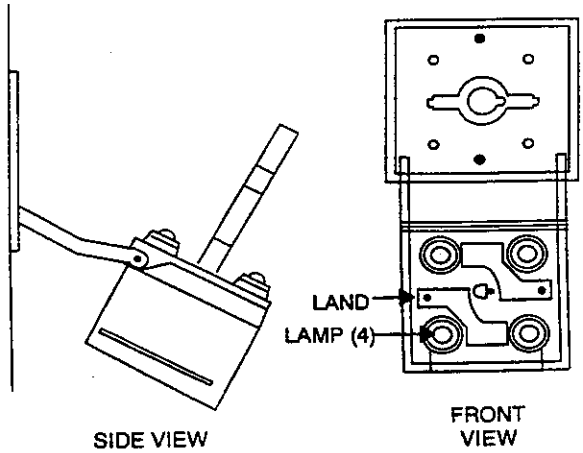

FIGURE 5-1. DMC LAMP HOLDER

116. RUN DMC DIAGNOSTICS.

a. Object. To verify that the DMC is operating error free.

b. Discussion. Since the Auto/Manual diagnostics and Verification run all the same tests, this procedure will use the Verification test. Exercise caution when changing DMC from STBY mode to Maintenance mode so as not to interfere with normal operations.

c. Test Equipment Required. None.

d. Conditions. The DMC under test must be in the Offline-Maintenance mode.

e. Detailed Procedure. Log on as maintainer and proceed as follows:

(1) At Summary Status screen, double click on Control Subsystem.

(2) At Control Subsystem Logical Unit Status Screen, click on STBY DMC.

(3) Click on Mode, then Offline-Maintenance from the pull down menu.

(4) Click on "OK" button in MODE CHANGE WARNING box.

(5) Click on "Escape" button when mode change is completed.

(6) Click on DMC in Mnt mode.

(7) Click on Verif from the menu bar.

(8) Click on "Start Test" button.

NOTE: At completion of LE STARTUP, the following message will appear: (No action required at this time, continue to step 9.)

DMC FRONT PANEL TESTS

Further testing must be completed at DMC front panel. Refer to Operations and Maintenance Manual for procedures. When completed, select <Pass> or <Fail> to indicate the results.

(9) At DMC under test, verify that the OFF-LINE indicator is illuminated indicating DMC is in the Offline-Maintenance mode. If it is not illuminated, verify that you are at the DMC under test.

(10) At DMC under test, verify that the red LOCAL indicator (part of the REMOTE/LOCAL switch/indicator) is flashing and all other indicators are illuminated. Press REMOTE/LOCAL switch/indicator and verify that the red LOCAL indicator is extinguished. Press REMOTE/LOCAL switch/indicator again and verify that the red LOCAL indicator is illuminated steady and the green REMOTE indicator is flashing.

(11) Press REMOTE/LOCAL switch/indicator and verify that the green REMOTE indicator is extinguished. Press the REMOTE/LOCAL switch/indicator again and verify that the REMOTE/LOCAL indicators are illuminated steady and the SWITCH A indicator is flashing.

(12) Press SWITCH A switch/indicator and verify that the SWITCH A indicator is extinguished. Press SWITCH A switch/indicator again and verify that the SWITCH A indicator is illuminated and the SWITCH B indicator is flashing.

(13) Press SWITCH B switch/indicator and verify that the SWITCH B indicator is extinguished. Press SWITCH B switch/indicator again and verify that the SWITCH B indicator is illuminated and the PRIMARY indicator is flashing.

(14) Press PRIMARY switch/indicator and verify that the PRIMARY indicator is extinguished. Press PRIMARY switch/indicator again and verify that all indicators are extinguished except REMOTE, OFF-LINE, and A/G SWITCHOVER CONTROL A or B (for the active A/G switch).

(15) When front panel testing is completed, if all tests pass, click on Pass.

(16) When tests have completed, review test results and if any failures occurred, take corrective action. If no failures, click on "RTN SVC" button.

(17) Click on OK button in Warning box and OK button in Verification box.

(18) When recovery of DMC is completed, click on Escape button.

(19) Mode transition STBY DMC to PRI and repeat par 116e, steps (2) through (18) for the other DMC.

117. CHECK A/G AND G/G SWITCH SHELF POWER SUPPLY LED'S, VOLTAGES, AND PCC INDICATORS.

a. Object. To verify that the switching subsystem power supplies are functioning properly.

b. Discussion.

(1) There are four shelf power supplies on the right side of each A/G & G/G cabinet with six test points each:

(a) A/G Control cabinet or G/G Node cabinet location A7, PS1, is power for Common Equipment Shelf A1.

(b) A/G Control cabinet or G/G Node cabinet location A7, PS2, is power for Common Equipment Shelf A2.

(c) A/G Expansion cabinet location A7, PS1 & PS2, are redundant power for Peripheral Shelves A1, A2, A3. (All voltages are redundant except −5.2 V.)

(d) A/G Control cabinet, A/G Expansion cabinet, and G/G Node cabinet location A8, PS1 & PS2, are redundant power for Peripheral Shelves A4, A5, A6. (All voltages are redundant except −5.2 V.)

(2) There are two power circuit breakers and two fan circuit breakers with related visual indicators on the PCC in the base of the cabinet.

(3) There are two ac indicators on the top front of the cabinet.

c. Test Equipment Required. Digital VOM.

d. Conditions. This procedure can be performed at any time.

CAUTION: Exercise caution when reading voltages. The input power circuit breaker/switch is sensitive and will trip easily. Measure A/G power supplies only when the A/G switch is in the standby mode.

e. Detailed Procedure.

(1) Check for two lit AC indicators on top front of cabinet.

(2) Open cabinet front door and check for a lit green LED for AC1, AC2, and DC on the four shelf power supplies. Check for two lit power indicators and two lit fan indicators on the PCC in the base of the cabinet.

(3) Using a digital VOM connect the black probe to GND test point and measure the voltages on the +5, +12, −12, −5.2, −48, and −5 V dc test points of each power supply.

(4) Close front cabinet door.

118. RUN A/G SWITCH P−NODE DIAGNOSTICS.

a. Object. To verify that the P−Node Common Equipment shelves of A/G switch A & B are operating error free.

b. Discussion. Exercise caution when changing shelf from STBY mode to Maintenance mode so as not to interfere with normal operations.

c. Test Equipment Required. None.

d. Conditions. The shelf under test must be in Offline-Maintenance mode.

e. Detailed Procedure. Log on as maintainer and proceed as follows:

(1) At Summary Status screen, double click on STBY A/G switch.

(2) Click on STBY P−Node shelf.

(3) Click on Mode, Offline-Ready from the pull down menu, then OK and Escape buttons.

(4) Click on RDY P−Node shelf.

(5) Click on Mode, Offline-Maintenance from the pull down menu, then OK and Escape buttons.

(6) Click on MNT P−Node shelf.

(7) Click on Diag, then Automatic from the pull down menu.

(8) Click on "Start Test" button.

(9) Click on "No" button for LE STARTUP. Automatic diagnostics will begin.

(10) When tests have completed, review test results and if any failures occurred, take corrective action. If no failures exist, click on "Escape" button.

(11) Click on MNT P−Node shelf.

(12) Click on Verif pull down menu then START TESTS button. Start tests must be run to execute an LE startup. This will ensure the shelf has valid object code.

(13) If all tests pass, click on Rtn Svc and OK buttons. When recovery of P–Node is completed, click on Escape button.

(14) Click on RDY P–Node shelf.

(15) Modeover RDY P–Node shelf to Online-Standby.

(16) Modeover STBY P–Node shelf to PRI and repeat par 118e, steps (2) through (15) for the other P–Node shelf.

119. RUN A/G SWITCH R–NODE DIAGNOSTICS.

a. Object. To verify that the R–Node Common Equipment shelves of A/G Switch A & B are operating error free.

b. Discussion. Exercise caution when changing shelf from STBY mode to Maintenance mode so as not to interfere with normal operations.

c. Test Equipment Required. None.

d. Conditions. The shelf under test must be in Offline-Maintenance mode.

e. Detailed Procedure. Log on as maintainer and proceed as follows:

(1) At Summary Status screen, double click on STBY A/G switch.

(2) Click on STBY R–Node shelf.

(3) Click on Mode, Offline-Ready from the pull down menu, then OK and Escape buttons.

(4) Click on RDY R–Node shelf.

(5) Click on Mode, Offline-Maintenance from the pull down menu, then OK and Escape buttons.

(6) Click on MNT R–Node shelf.

(7) Click on Diag, then Automatic from the pull down menu.

(8) Click on "Start Test" button.

(9) Click on "No" button for LE STARTUP. Automatic diagnostics will begin.

(10) When tests have completed, review test results and if any failures occurred, take corrective action. If no failures exist, click on "Escape" button.

(11) Click on MNT R–Node shelf.

(12) Click on Verif pull down menu then Start Tests button. Start Tests must be run to execute an LE Startup. This will ensure the shelf has valid object code.

(13) If all tests pass, click on Rtn Svc and OK buttons. When recovery of R–Node is completed, click on Escape button.

(14) Click on RDY R–Node shelf.

(15) Modeover RDY R–Node shelf to Online-Standby.

(16) Modeover STBY R–Node shelf to PRI and repeat par 119e, steps (2) through (15) for the other R–Node shelf.

120. RUN G/G SWITCH NODE DIAGNOSTICS.

a. Object. To verify that the common equipment shelves of all G/G NODEs are operating error free.

b. Discussion. Exercise caution when changing shelf from STBY mode to Maintenance mode so as not to interfere with normal operations.

c. Test Equipment Required. None.

d. Conditions. The shelf under test must be in Offline-Maintenance mode.

e. Detailed Procedure. Log on as maintainer and proceed as follows:

(1) At Summary Status screen, double click on G/G Node to be tested.

(2) Click on STBY shelf.

(3) Click on Mode, Offline-Ready from the pull down menu, then OK and Escape buttons.

(4) Click on RDY shelf.

(5) Click on Mode, Offline-Maintenance from the pull down menu, then OK and Escape buttons.

(6) Click on MNT shelf.

(7) Click on Diag, then Automatic from the pull down menu.

(8) Click on "Start Test" button.

(9) Click on "No" button for LE STARTUP. Automatic diagnostics will begin.

(10) When tests have completed, review test results and if any failures occurred, take corrective action. If no failures exist, click on "Escape" button.

(11) Click on MNT shelf.

(12) Click on Verif pull down menu then START TESTS button. Start tests must be run to execute an LE startup. This will ensure the shelf has valid object code.

(13) If all tests pass, click on Rtn Svc and OK buttons, When recovery of G/G shelf is completed, click on Escape button.

(14) Click on RDY G/G shelf.

(15) Modeover RDY G/G shelf to Online-Standby.

(16) Modeover STBY G/G shelf to PRI and repeat par 120e, steps (2) through (15) for the other shelf.

121. INSPECT SINGLE PORT TRANSCEIVER LED'S.

a. Object. To verify that all A/G and G/G single-port ethernet transceivers are functioning properly.

b. Discussion. The single-port transceivers are connected to the thick-net BusLAN coaxial cable.

(1) The transceivers for A/G Switch A & B, G/G Nodes, and CCS Bus connections are located in the FOTT cabinets.

(2) Transceivers for the Maintenance Position, DMC, and Tandem connections are mounted on dartboards located in the equipment room. The A/G and G/G primary buses are located on Dartboard units 14A401A1 and 14A402A1. The A/G and G/G backup buses are located on Dartboard units 14A1401A2 and 14A1402A2. The outer loop of the thick-net cable (transceivers A1–A6) is for the G/G bus. The inner loop of the thick-net cable (transceivers A7–A10) is for the A/G bus.

(3) Transceivers for the multiport connections are located on the side of the cable tray at the top rear of the M1 console and at multiport transceiver frames/cabinets located in site specific areas.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) For each of the locations below, verify, that the green PWR LED is lit, the COL LED is not lit for more than one minute at a time, and the amber SQE LED is lit. The amber SQE LED will not be lit if the single-port transceiver is connected to a multi-port transceiver.

(2) Check all transceivers in all A/G and G/G FOTT cabinets.

(3) Check transceivers on all Dartboards.

(4) Check transceivers at the rear of all M1 consoles.

(5) Check transceivers at multiport transceiver frames/cabinets.

122. INSPECT MULTIPORT TRANSCEIVER LED'S.

a. Object. To verify that all A/G and G/G multiport transceivers are functioning properly.

b. Discussion. The multiport transceivers are located at the rear and above the M1 console position equipment. Rack and cabinet mounted multiport transceivers are located in site specific areas.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure. Verify that the red PWR LED is lit at all multiport locations.

NOTE: The red XMIT LED will flash intermittently with traffic on the bus.

123. CHECK WORKSTATION HUB LED'S.

a. Object. To verify that the workstation LAN is functioning properly.

b. Discussion. The workstation hubs are the Cabletron MRXI-24, 10Base-T with Lanview. One is located in the Test Equipment Rack Assembly cabinet, 1A5, and the other one is located in the Timing Equipment Rack Assembly cabinet, 6A1. There is also a single port transceiver, Cabletron ST-500 with Lanview, located at each hub.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Open cabinet rear door.

(2) Verify the following LED's on the hubs are lit:

(a) Flashing green CPU (1 second rate)

(b) Steady green PWR.

NOTE: The RCV LED will flash with LAN traffic.

(3) Verify the following LED's on the single port transceivers are lit:

(a) Steady green PWR.

(b) Steady amber SQE.

NOTE: The XMIT, RCV, and CLN LED's will flash with LAN traffic.

(4) Close rear cabinet door.

124. CHECK POWER CONDITIONING SYSTEM DISPLAY PANEL INDICATIONS.

a. Object. To ensure that Liebert power conditioners are functioning properly.

b. Discussion. The display panel on the front of the Power Conditioning System (PCS) has two buttons, SCAN and HOLD/SEQUENCE. The display normally scans all readings. Pressing the HOLD/SEQUENCE button will stop the scan and allow manual sequencing through the readings.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure. Verify that readings on the front display panel of the PCS are within tolerances.

125. CHECK INTERPROCESSOR X/Y BUSSES STATUS.

a. Object. To verify both the X and Y processor busses are operating properly.

b. Discussion. This procedure checks the X and Y busses to all CPU's.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed during normal system operations. If a printout is not desired, execute steps 1, 2, 6, 7, and 9 only.

e. Detailed Procedure.

(1) Log on to the Tandem system OPS console as SUPER.STARTUP.

(2) Type: TMDS IPB

(3) Type: LOG $DATA5.TEST.IPBLOG

(4) Type: TIME

(5) Type: ENV

(6) Type: STATUS

(7) Verify X/Y bus are up

(8) Type: LOG STOP

(9) Type: EXIT (returns you to TACL prompt)

(10) Type: PRINT $DATA5.TEST.IPBLOG

(11) Type:
FUP PURGE $DATA5.TEST.IPBLOG
(Answer yes [y] to delete file.)

126. CHECK RUBIDIUM FREQUENCY STANDARD.

a. Object. To verify the Rubidium Frequency Standard parameters and the condition of the internal batteries.

b. Discussion. Maximum internal battery capacity can be sustained while the unit is on trickle charge during ac operation. If a Rubidium Frequency unit is to be stored over a long period of time (i.e., as a spare), the internal battery switch should be placed in

the OFF position to prevent deep discharge. After six to twelve months of storage at ~25° C, the internal batteries will require recharging. It is recommended that the unit be warmed-up for at least ten minutes before the internal battery switch is turned on.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

NOTE: Ensure the internal battery switch, located on the top left side on the rear of the unit, is switched to ON.

e. Detailed Procedure.

(1) Open Timing and Control cabinet front door at location 6A1.

(2) On the front panel of the Rubidium Frequency Standard, rotate the meter function switch to each of its positions and verify that the readings are correct. Refer to Table 5–4 for additional information. If any of the tests fail the Rubidium unit will need to be replaced.

NOTE: Further testing of the internal battery pack will be accomplished by the following steps.

(3) Disconnect external ac power to the Rubidium unit so that it is operating on internal battery power only. The POWER ON LED will extinguish. The OPERATION LED should remain lit. There should not be an alarm at the MPES. If there is an alarm it indicates the internal batteries are not fully charged or defective.

(4) Allow the unit to operate on internal battery power for approximately thirty (30) minutes.

(5) Set the meter function switch to DC SUPPLY and verify that the meter indication is within the black portion of the meter scale.

NOTE: If the meter indication is not in the black portion of the scale, it indicates the internal batteries are defective and the unit will need to be replaced.

(6) Restore external ac power to the Rubidium unit. The POWER ON LED will light and the OPERATION LED should remain lit.

(7) Close cabinet front door.

TABLE 5–4. RUBIDIUM FREQUENCY STANDARD OPERATIONAL CHECKS

SWITCH POSITION	METER INDICATION	REMARKS
CONTROL VOLTAGE	> +5 < +40	Proper operating range.
	< +5 > +40	Perform COMPENSATION FOR CRYSTAL AGING, Rubidium Frequency Standard, Operation and Maintenance Manual, Section 4, Paragraph 4.7.
RUBIDIUM LAMP	Black portion of meter scale.	Correct rubidium lamp voltage.
DC SUPPLY	Black portion of meter scale.	Internal dc and/or battery voltage sufficient for normal operation.
	Below Black portion of meter scale	Internal dc and/or battery voltage insufficient for normal operation.

TABLE 5-4. RUBIDIUM FREQUENCY STANDARD OPERATIONAL CHECKS (Continued)

SWITCH POSITION	METER INDICATION	REMARKS
CHARGE CURRENT	0 to +5	Battery pack is sufficiently charged to operate independent of external power.
	+10 to +15	Battery pack is not sufficiently charged. Continue to operate on ac line voltage
	~ −13 to −15	Unit is operating on internal batteries only.
	~ 0 to −12	Unit is operating on inadequate dc voltage and internal batteries are discharging.

127. MEASURE A/G VOICE TRANSMISSION PARAMETERS.

a. Object. To verify correct transmission parameters for all A/G Radio Interface cards.

b. Discussion. Voice Channel Test (VCT) will be used to verify transmission levels. This testing must be coordinated with Air Traffic Control.

c. Test Equipment Required. Portable TIMS, Test cords, Facilities Reference Data File (FRDF), System Maintenance Manual TI 6690.19 Table 6-19 (A/G Virtual Radio/Circuit Cross Reference).

d. Conditions. Both A and B Radio cards must be in the Offline Maintenance mode in both A/G switches. If BUEC interface cards are being tested, the BUEC cards must be in the Offline Maintenance mode in both A/G switches. When testing interface cards be sure the primary switch is selected. The voice paths are connected through to the VSCS IDF only in the switch that is primary.

e. Detailed Procedure.

(1) Connect a dual bantam test cord between the VSCS IDF EQ IN/EQ OUT jacks and the Test Jack (JEWEL) EQPT IN/EQPT OUT before sending tone and remove it only when testing is completed. This will prevent test tones being transmitted.

(2) Logon as maintainer. At Summary Status screen, double click on the standby A/G switch.

(3) At A/G Switch Logical Unit Status screen, click on [RADIO or BUEC] INTFC.

NOTE: When testing Radio interface cards, transition the STBY card to maintenance before transitioning the PRI card to maintenance to avoid a modeover.

(4) At [RADIO or BUEC] INTFC screen, click on the interface to be tested.

(5) Click on Mode then Offline-Ready from the pull down menu.

(6) Click on OK then Escape buttons in Mode Change box.

(7) Click on RDY [Radio or Buec] interface.

(8) Click on Mode then Offline-Maintenance from the pull down menu.

(9) Click on OK then Escape buttons in Mode Change box.

(10) Repeat par 127e, steps (4) through (9) for the other interface card.

(11) From the Summary Status screen, double click on the primary A/G switch and repeat par 127e, steps (3) through (10) to transition other interfaces to be tested to MNT mode.

NOTE: Make a note of which switch is primary. If you forget, look at the Switch A and Switch B indicator on the DMC front panel. **Testing must be done in the Primary A/G switch.**

(12) Click on Screen then Voice Channel Tests from the pull down menu.

(13) Select EXT LB: A/G [A or B] [Radio or BUEC] Interface from the test list and click on OK button.

(14) Enter Frequency, Site and Card [A or B], or Radio location, then click on OK button.

(15) Click on CONNECT button.

(16) After the path is connected, select Manual test, Disable AGC, then click on START TEST button.

(17) At the Test Equipment Rack (1A5), set the rack mounted TIMS as follows:

LINE = 600 ohms (TX & RX),
Term (BRDG OFF), 4W
SEND = 1004 Hz
LEVEL = −9 dBm
MEASURE = LVL FREQ

NOTE: The Ameritec TIMS is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Send Function Row Enable Key
(b) Function — 2 Enable Key
(c) Function — D Enable Key
(d) Function — # Enable Key
(e) Function — 9 Enable Key
(f) Function — D Enable Key
(g) Measure Function Row Enable Key
(h) Function — 1 Enable Key

(18) At the Audio Jack Panel, set the portable TIMS as follows:

LINE = 600 ohms (TX & RX),
Term (BRDG OFF), 4W
SEND = 1004 Hz
LEVEL = nominal level (site specific; i.e., −17 dBm, −21 dBm)
MEASURE = LVL FREQ

(19) Connect a test cord from the portable TIMS TX jack to the Audio Jack Panel (1A5A2) EQPT IN jack of the interface under test.

(20) Connect a test cord from the portable TIMS RX jack to the Audio Jack Panel (1A5A2) EQPT OUT jack of the interface under test.

(21) Measure the circuit receive level on the rack-mounted TIMS.

(22) Measure the circuit transmit level on the portable TIMS.

(23) Verify the readings with the levels in the FRDF.

(24) At the workstation, click on STOP TEST button, then TEST button.

NOTE: Further testing will be accomplished with the A/G interface in loopback mode. Loopback will be accomplished using the Tellabs 4001A or 4410S module located in the Test Equipment Rack, 1A5A3, with the appropriate attenuation set (i.e. the difference between actual transmit level and receive level set on radio card). Refer to System Maintenance Manual, TI 6690.19, Section 6, Paragraph 10, for guidance and instruction on setting these modules for external loopback.

(25) Connect a test cord between the Audio Jack Panel EQPT OUT jack and the AMP [1 or 2] IN jack of the 4001A module. Connect a test cord between the Audio Jack Panel EQPT IN jack and the AMP [1 or 2] OUT jack of the 4001A module. If using a 4410S module, connect a test cord between the Audio Jack Panel EQPT OUT jack and the RCV IN or XMIT IN jack of the 4410S module. Connect a test cord between the Audio Jack Panel EQPT IN jack and the RCV OUT or XMIT OUT jack of the 4410S module.

(26) Perform the Levels, Background Noise, and Frequency Response tests and verify results. Test results may be printed, if desired. Click on ESCAPE button after each test is completed.

(27) When all testing is completed, click on ESCAPE button.

NOTE: Repeat par 127e, steps (12) through (27) for other interface cards in the primary switch being tested.

(28) Execute an A/G Switchover to make the standby switch primary.

(29) Repeat par 127e, steps (12) through (27) for all interface cards in the A/G primary switch.

(30) After all interface cards have been tested, remove all loop back cords at the Audio Jack panel

and the dual bantam test cord between IDF EQ IN/EQ OUT jacks and the Test Jack (JEWEL).

(31) Click on Screen then Summary Status from the pull down menu.

(32) At the [RADIO or BUEC] INTFC screen, click on the [RADIO or BUEC] INTFC under test.

(33) Click on Verif pull down menu then Start Tests button. If all tests pass, click on Rtn Svc and OK buttons.

(34) When recovery of the interface is completed, click on ESCAPE button.

(35) Click on the RDY [RADIO or BUEC] interface under test.

(36) Mode transition the RDY [RADIO or BUEC] interface to appropriate online mode.

(37) Repeat par 127e, steps (32) through (36) to return all interfaces that were tested to an online mode.

128. MEASURE G/G VOICE TRANSMISSION PARAMETERS.

a. Object. To verify correct transmission parameters for all G/G trunks.

b. Discussion. Voice Channel Test (VCT) will be used to verify transmission levels. This testing must be coordinated with Air Traffic Control.

c. Test Equipment Required. Portable TIMS, Test cords, Facilities Reference Data File (FRDF), System Maintenance Manual TI 6690.19 Table 6–20 (G/G Virtual/Circuit Cross Reference).

d. Conditions. G/G trunk interfaces to be tested must be in the Offline Maintenance mode. This procedure is applicable only to four wire trunks.

e. Detailed Procedure.

(1) Connect a dual bantam test cord between the VSCS IDF EQ IN/EQ OUT jacks and the Test Jack (JEWEL) EQPT IN/EQPT OUT before sending tone and remove it only when testing is completed. This will prevent test tones being transmitted.

(2) Logon as maintainer. At Summary Status screen, double click on desired G/G switch node.

(3) At G/G Switch Group Logical Unit Status screen, click on TEL.

(4) At Trunk INTFC screen, click on the trunk interface to be tested.

(5) Click on Mode then Offline-Maintenance from the pull down menu.

(6) Click on OK then Escape buttons in Mode Change box.

(7) Click on Screen then Voice Channel Tests from the pull down menu.

(8) Select EXT LB: G/G Trunk Interface from the test list and click on OK button.

(9) Select Node for trunk under test.

(10) Enter IA CODE or TRUNK location (location is required input for PABX interfaces) and click on OK button.

(11) Click on CONNECT button.

(12) After the path is connected, select Manual test, Disable AGC, then click on START TEST button.

(13) At the Test Equipment Rack (1A5), set the rack mounted TIMS as follows:

LINE = 600 ohms (TX & RX),
TERM (BRDG OFF), (4W)
SEND = 1004 Hz
LEVEL = −9 dBm
Measure = LVL FREQ

NOTE: The Ameritec TIMS is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Send Function Row Enable Key
(b) Function — 2 Enable Key
(c) Function — D Enable Key
(d) Function — # Enable Key
(e) Function — 9 Enable Key
(f) Function — D Enable Key
(g) Measure Function Row Enable Key
(h) Function — 1 Enable Key

(14) At the Audio Jack Panel, Set the portable TIMS as follows:

LINE = 600 ohms (TX & RX),
TERM (BRDG OFF), (4W)
SEND = 1004 Hz
LEVEL = nominal level (site specific)

MEASURE = LVL FREQ

(15) Connect a test cord from the portable TIMS TX jack to the Audio Jack Panel (1A5A2) EQPT IN jack of the interface under test.

(16) Connect a test cord from the portable TIMS RX jack to the Audio Jack Panel (1A5A2) EQPT OUT jack of the interface under test.

(17) Measure the circuit receive level on the rack-mounted TIMS.

(18) Measure the circuit transmit level on the portable TIMS.

(19) Verify the readings with the levels in the FRDF.

NOTE: If the trunk interface card levels are set for other than factory settings, loopback may have to be done through the AMP1 IN and OUT or AMP2 IN and OUT jacks of the Tellabs 4001A module or the RCV IN and OUT or XMIT IN and OUT of the Tellabs 4410S module in the test equipment rack, 1A5A3, with appropriate attenuation set (i.e. the difference between actual transmit level and receive level set on trunk card). Refer to System Maintenance Manual, TI 6690.19, Section 6, Paragraph 10, for guidance and instruction on setting these modules for external loopback.

(20) Remove test cords from the portable TIMS and place loopback cords either directly in the Audio Jack Panel EQ IN/EQ OUT jacks or through the Tellabs 4001A or 4410S module.

(21) At the workstation, click on STOP TEST button, then the TEST button.

(22) Perform the Levels, Background Noise, and Frequency Response tests and verify results. Test results may be printed, if desired. Click on ESCAPE button after each test is completed.

(23) When all testing is completed, click on ESCAPE button.

(24) When testing of this G/G interface card is completed, remove the loop back cord at the Audio Jack panel and the dual bantam test cord between IDF EQ IN/EQ OUT jacks and the Test Jack (JEWEL).

(25) Click on Screen then Summary Status from the pull down menu.

(26) At the Trunk INTFC screen, click on the Trunk INTFC under test.

(27) Click on Verif pull down menu then Start Tests button. If all tests pass, click on Rtn Svc and OK buttons.

(28) When recovery of the interface is completed, click on ESCAPE button.

129. MEASURE TRANSMISSION LEVEL REGULATION TO LEGAL RECORDERS.

a. Object. To verify correct transmission levels to the legal recorders. A 1004 hz tone will be transmitted at −18 dBm, −9 dBm, and +6 dBm to also test the levels regulation of the position AGC.

b. Discussion. This testing must be coordinated with Air Traffic Control (ATC). An A/G frequency, that appears on the position under test, and the position under test, must be released by ATC. This procedure will need to be performed at each VSCS position.

c. Test Equipment Required. Two TIMS, test cords, DJM BOB, legal recorder patch panel reference documentation, and System Maintenance manual TI 6690.19 Table 6−19 (A/G Virtual Radio/Circuit Cross Reference).

d. Conditions. One ATC position and related recorder channels and one A/G frequency will be unavailable during this procedure. The position must have an A/G map. The A/G DJM will be used to send test tone during this procedure. This will allow both recorder channels through the VCE Analog card to be checked.

NOTE: Insert a test cord in the EQ OUT jack of the A/G test frequency, before starting any testing, to prevent test tones being transmitted.

NOTE: If the position under test is a VTABS position, ensure that the PEM is switched to VSCS (the VSCS LED on the PEM will be lit).

e. Detailed Procedure.

(1) If you are not sure which DJM is A/G do the following at the position under test:

(a) Plug a handset/headset into either DJM.

(b) At either VDM touch the SCRN ALT and UTIL buttons.

(c) To the right of the GG and AG buttons on the UTIL screen, the headset button will be white for the DJM in use.

(2) Plug the DJM BOB into the A/G DJM. Power on the DJM BOB.

NOTE: If using the rack mounted TIMS, at the Test Equipment Rack, to test the MPES positions, the AM6 Test Access System must be powered off to avoid wrong level readings.

(3) Power on the TIMS at the position and set as follows to transmit the three different levels, as needed:

Line = 600 ohms (TX & RX),
TERM (BRDG OFF), (4W)
Send = 1004 Hz
Level = [−9 dBm, −18 dBm, +6 dBm]

NOTE: The Ameritec TIMS is set to these parameters by pressing the front panel buttons in the following sequence:

(a) Send Function Row Enable Key
(b) Function — 2 Enable Key
(c) Function — D Enable Key
(d) Function — # Enable Key (for negative level)
(e) Function — 9 Enable Key (−9 dBm)
Function — 18 Enable Key (−18 dBm)
Function — 6 Enable Key (+6 dBm, don't use #)
(f) Function — D Enable Key

(4) Connect a test cord from the TIMS TX jack to the TEST EQPT TX jack on the DJM BOB.

(5) At the position under test, select the frequency to be used for testing. Press the PTT button on the DJM BOB.

(6) Power on the TIMS at the legal recorder patch panel and set as follows:

Line = 600 ohms (TX & RX), BRDG, 4W
Measure = LVL FREQ

(7) At the legal recorder patch panel the test tone will appear on both VCE channels 1 and 2. Using the TIMS at the patch panel, measure the level on VCE channel 1 and 2 MON jacks, for each of the three levels transmitted from the position, and verify it with Standard & Tolerances, 74b.

(8) Remove all test equipment from the position and the recorder frame jack panel. Remove test cord from the EQ OUT jack at the IDF and return the A/G frequency to ATC.

130. MEASURE TWO–WIRE G/G VOICE TRANSMISSION PARAMETERS.

a. Object. To verify correct transmission parameters for 2 wire G/G trunks.

b. Discussion. Voice Channel Test (VCT) will be used to verify transmission levels. The testing must be coordinated with Air Traffic Control.

c. Test Equipment Required. Portable TIMS, Test cords, Facilities Reference Data File (FRDF), System Maintenance Manual, TI 6690.19, Table 6–20 (G/G Virtual/Circuit Cross reference).

d. Conditions. G/G trunk interfaces to be tested must be in the Offline Maintenance mode. When testing 2-wire trunks, transmit and receive levels both appear on the same jack. The jack is site specific (EQ IN or EQ OUT).

NOTE: Perform tests in only one direction at a time.

(1) For Type 3–LSO and Type 8, which use Tellabs 6131A, it is necessary to set the portable TIMS for TX/2W OFF HOOK, TERM(BRDG OFF) and QUIET. When this is done, the 6131A BUSY LED will be illuminated. If the 6131A is not busy, audio will not pass through the module.

(2) When testing Type 3 LSS and Type 6, which uses the Tellabs 6131B, it is necessary to set the portable TIMS for 2 Wire mode but not OFF HOOK. The OFF HOOK is not required to test Type 3 LSS and Type 6 circuits, although these circuits can be tested with OFF HOOK selected. Since it will not affect the test, this procedure is written to include OFF HOOK as a generic test setup for simplicity.

e. Detailed Procedure.

(1) Insert a dual bantam test cord between the VSCS IDF EQ IN/EQ OUT jacks of the circuit under test and the Test Jack (JEWEL) EQPT IN/EQPT OUT. Remove this cord only when testing is completed. This will prevent test tones from being transmitted.

(2) Logon as maintainer. At Summary Status screen, double click on desired G/G switch node.

(3) At G/G Switch Group Logical Unit Status screen, click on TEL.

(4) At Trunk INTFC screen, click on the trunk interface to be tested.

(5) Click on Mode then Offline-Maintenance from the pull down menu.

(6) Click on OK then Escape buttons on Mode Change box and acknowledge the alarm window.

(7) Click on Screen then Voice Channel Tests from the pull down menu.

(8) Select EXT LB: G/G Trunk Interface from the Voice Channel Path list and click on OK button.

(9) Select Node for trunk under test.

(10) Enter IA CODE or TRUNK location and click on OK button.

(11) Click on CONNECT button.

(12) After the path is connected, select Manual test, Disable AGC, then click on START TEST button.

(13) At the Test Equipment Rack (1A5), set the rack mounted TIMS as follows:

LINE = 600 ohms (TX & RX)
TERM (BRDG OFF), 4W
MEASURE = LVL/FREQ
SEND = 1004 Hz
LEVEL = −9 dBm

NOTE: The Ameritec TIMS (Rack) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key
(b) Function — 2 Enable Key
(c) Function — 8 Enable Key
(d) Function — #/+/− Enable Key
(e) Function — C Enable Key
(f) Measure Function Row Key
(g) Function — 1 Enable Key
(h) Send Function Row Enable Key
(i) Function — 2 Enable Key
(j) Function — D Enable Key
(k) Function — #/+/− Enable Key
(l) Function — 9 Enable Key
(m) Function — D Enable Key
(n) Function — D Enable Key

(14) At the Audio Jack Panel, Set the portable TIMS as follows:

LINE = 600 ohms (TX & RX)
OFF HOOK for TX/2W
TERM (BRDG off), 2W.
SEND = QUIET
MEASURE = LVL/FREQ

NOTE: The Ameritec TIMS (Portable) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key
(b) Function — 2 Enable Key
(c) Function — 8 Enable Key
(d) Function — 5 Enable Key
(e) Function — #/+/− Enable Key
(f) Function — B Enable Key
(g) Send Function Row Enable Key
(h) Function — 1 Enable Key
(i) Measure Function Row Key
(j) Function — 1 Enable Key

(15) Connect a test cord from the portable TIMS TX/2W jack to the Audio Jack Panel (1A5A2) EQ IN or EQ OUT jack (site specific) of the interface under test.

(16) Measure the TX level on the portable TIMS.

(17) Verify the reading with the level in the FRDF.

NOTE: When completed, the check must be done in the reverse direction for 2 wire circuits. DO NOT remove the test cord connected between the portable TIMS TX jack and the Audio Jack Panel (1A5A2) EQ IN or EQ OUT jack of the interface under test when performing test in the reverse order.

(18) Set the portable TIMS as follows:

LINE = 600 ohms (TX & RX)
OFF HOOK for TX/2W
TERM (BRDG OFF), 2W
MEASURE = LVL/FREQ
SEND = nominal value

NOTE: For circuits set to 0/0 the nominal value is −9 dBm.

NOTE: The Ameritec TIMS (Portable) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key
(b) Function — 2 Enable Key
(c) Function — 8 Enable Key

(d) Function — 5 Enable Key
(e) Function — #/+/− Enable Key
(f) Function — B Enable Key
(g) Measure Function Row Key
(h) Function — 1 Enable Key
(i) Send Function Row Enable Key
(j) Function — 2 Enable Key
(k) Function — D Enable Key
(l) Function — #/+/− Enable Key
(m) Function — 9 Enable Key
(n) Function — D Enable Key
(o) Function — D Enable Key

(19) Set the rack mounted TIMS as follows:

LINE = 600 ohms (TX & RX)
TERM (BRDG OFF), 4W
SEND = QUIET
MEASURE = LVL/FREQ

NOTE: The Ameritec TIMS (Rack) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key
(b) Function — 2 Enable Key
(c) Function — 8 Enable Key
(d) Function — #/+/− Enable Key
(e) Function — C Enable Key
(f) Send Function Row Enable Key
(g) Function — 1 Enable Key
(h) Measure Function Row Key
(i) Function — 1 Enable Key

(20) Measure the RX level on the rack mounted TIMS.

(21) Verify the reading with the level in the FRDF.

(22) At the workstation, click on STOP TEST button, then the test button.

NOTE: When performing Levels and Background Noise tests, AGC will be set to Enable. When performing Frequency Response tests, AGC will be set to Disable.

(23) At the workstation select Manual test, AGC enable and Start Test.

(24) For LEVELS test, set the rack mounted TIMS as follows:

LINE = 600 ohms (TX & RX)
TERM (BRDG OFF), 4W
SEND = QUIET
MEASURE = LVL/FREQ

NOTE: The Ameritec TIMS (Rack) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key
(b) Function — 2 Enable Key
(c) Function — 8 Enable Key
(d) Function — #/+/− Enable Key
(e) Function — C Enable Key
(f) Send Function Row Enable Key
(g) Function — 1 Enable Key
(h) Measure Function Row Key
(i) Function — 1 Enable Key

NOTE: This portion of the test is measuring the minimum, maximum and nominal levels for AGC circuit input. Circuits with a TX and RX level of 0/0 must be tested with the portable TIMS set at the following values; −16, −9 and −1 dBm. Circuits with a TX and RX level of +7/−16 must be tested with the portable TIMS set at −2, −9 and +6 dBm.

(25) For LEVELS test set the portable TIMS as follows:

LINE = 600 ohms (TX & RX)
OFF HOOK for TX/2W
TERM (BRDG off) 2W
SEND = specific test value (example, −16 dBm, −9 dBm or −1 dBm for 0/0 circuits).

NOTE: The Ameritec TIMS (Portable) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key
(b) Function — 2 Enable Key
(c) Function — 8 Enable Key
(d) Function −5 Enable Key
(e) Function — #/+/− Enable Key
(f) Function −B Enable Key
(g) Send Function Row Enable Key
(h) Function −2 Enable Key
(i) Function D Enable Key
(j) Function — #/+/− Enable Key
(k) Function — [1, 9, or 1&6] Enable Key
(l) Function — D Enable Key
(m) Function — D Enable Key

(26) Measure the RX levels at the rack mounted TIMS.

(27) Verify the readings with the FRDF.

(28) Repeat steps 25 to 27 until all three levels are tested.

(29) For BACKGROUND noise test set the portable TIMS as follows:

LINE = 600 ohms (TX & RX)
OFF HOOK for TX/2W
TERM (BRDG OFF), 2W
SEND = QUIET
MEASURE = noise
AUX = cmsg

NOTE: The Ameritec TIMS (Portable) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key
(b) Function — 2 Enable Key
(c) Function — 8 Enable Key
(d) Function −5 Enable Key
(e) Function — #/+/− Enable Key
(f) Function −B Enable Key
(g) Send Function Row Enable Key
(h) Function — 1 Enable Key
(i) Measure Function Row Key
(j) Function — 2 Enable Key
(k) Aux Function Row Enable Key
(l) Function — 2 Enable Key

(30) For Background Noise test set the rack mounted TIMS as follows:

LINE = 600 ohms (TX & RX)
TERM (BRDG OFF), 4W
SEND = QUIET
MEASURE = noise
AUX = cmsg

NOTE: The Ameritec TIMS (Rack) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key
(b) Function — 2 Enable Key
(c) Function — 8 Enable Key
(d) Function — #/+/− Enable Key
(e) Function — C Enable Key
(f) Send Function Row Enable Key
(g) Function — 1 Enable Key
(h) Measure Function Row Key
(i) Function — 2 Enable Key
(j) Aux Function Row Enable Key
(k) Function — 2 Enable Key

(31) Measure the Background Noise level at both the rack mounted TIMS and the portable TIMS.

(32) Verify readings with the FRDF.

(33) At the workstation, click on STOP TEST button, then the test button.

(34) At the workstation select Manual test, AGC Disable and Start Test.

(35) For RX path Frequency Response test set the rack mounted TIMS as follows:

LINE = 600 ohms (TX & RX)
TERM (BRDG OFF), 4W
SEND = QUIET
MEASURE = LVL/FREQ

NOTE: The Ameritec TIMS (Rack) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key
(b) Function — 2 Enable Key
(c) Function — 8 Enable Key
(d) Function — #/+/− Enable Key
(e) Function — C Enable Key
(f) Send Function Row Enable Key
(g) Function — 1 Enable Key
(h) Measure Function Row Key
(i) Function — 1 Enable Key

(36) For FREQUENCY RESPONSE test set the portable TIMS as follows:

LINE = 600 ohms (TX & RX)
OFF HOOK for TX/2W
TERM (BRDG OFF), 2W
MEASURE = LVL/FREQ
SEND = 1004 Hz at 0 dBm

NOTE: The Ameritec TIMS (Portable) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key
(b) Function — 2 Enable Key
(c) Function — 8 Enable Key
(d) Function 5 Enable Key
(e) Function — #/+/− Enable Key
(f) Function B Enable Key
(g) Measure Function Row Key
(h) Function — 1 Enable Key
(i) Send Function Row Enable Key
(j) Function — 2 Enable Key
(k) Function — D Enable Key

(l) Function — 0 Enable Key
(m) Function — D Enable Key
(n) Function — D Enable Key

(37) Record the RX value on rack mounted TIMS. This value is the RX path reference level.

(38) Set the portable TIMS as follows:

LINE = 600 ohms (TX & RX)
OFF HOOK for TX/2W
TERM (BRDG OFF), 2W
MEASURE = LVL/FREQ
SEND = SF SKIP, SWEEP

NOTE: The Ameritec TIMS (Portable) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key
(b) Function — 2 Enable Key
(c) Function — 8 Enable Key
(d) Function 5 Enable Key
(e) Function — #/+/− Enable Key
(f) Function B Enable Key
(g) Measure Function Row Key
(h) Function — 1 Enable Key
(i) Send Function Row Enable Key
(j) Function −A Enable Key
(k) Function — 5 Enable Key

NOTE: All SWEEP parameters are adjustable with the PARAM SET key by repeatedly pressing the Function D Enable Key and entering the appropriate values on the Function Row number keys. A longer RATE will give the technician more time to record the results.

Recommended settings:

LEVL = 0 dBm
STRT = Start of sweep (0.304 kHz)
STOP = End sweep (3.004 kHz)
STEP = Step size of frequency (0.100 kHz)
RATE = Duration of each tone (3.0/5.0 sec)
DLAY = Time inserted before & after sweep sequence (2.0 sec)

Press Function — 5 Enable key to restart the sweep sequence.

(39) Record the levels on the rack mounted TIMS for RX path frequencies between 300 Hz and 3 kHz. Select Send QUIET on the portable TIMS when test is completed.

NOTE: With SF SKIP selected, the TIMS will not test the frequency range between 2404 Hz to 2804 Hz.

(40) For TX path Frequency Response test, set the portable TIMS as follows:

LINE = 600 ohms (TX & RX)
OFF HOOK for TX/2W
TERM (BRDG OFF), 2W
SEND = QUIET
MEASURE = LVL/FREQ

NOTE: The Ameritec TIMS (Portable) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key
(b) Function — 2 Enable Key
(c) Function — 8 Enable Key
(d) Function 5 Enable Key
(e) Function — #/+/− Enable Key
(f) Function B Enable Key
(g) Send Function Row Enable Key
(h) Function — 1 Enable Key
(i) Measure Function Row Key
(j) Function — 1 Enable Key

(41) For Frequency Response test, set the rack mounted TIMS as follows:

LINE = 600 ohms (TX & RX)
TERM (BRDG OFF), 4W
MEASURE = LVL/FREQ
SEND = 1004 Hz at 0 dBm

NOTE: The Ameritec TIMS (Rack) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key
(b) Function — 2 Enable Key
(c) Function — 8 Enable Key
(d) Function — #/+/− Enable Key
(e) Function — C Enable Key
(f) Measure Function Row Key
(g) Function — 1 Enable Key
(h) Send Function Row Enable Key
(i) Function — 2 Enable Key
(j) Function — D Enable Key
(k) Function — 0 Enable Key
(l) Function — D Enable Key
(m) Function — D Enable Key

(42) (Record the TX value on portable TIMS. This value is the TX path reference level.

(43) Set the rack mounted TIMS as follows:

LINE = 600 ohms (TX & RX)
TERM (BRDG OFF), 4W
MEASURE = LVL/FREQ
SEND = SF SKIP, SWEEP

NOTE: The Ameritec TIMS (Rack) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key
(b) Function — 2 Enable Key
(c) Function — 8 Enable Key
(d) Function — #/+/− Enable Key
(e) Function — C Enable Key
(f) Measure Function Row Key
(g) Function — 1 Enable Key
(h) Send Function Row Enable Key
(i) Function — A Enable Key
(j) Function — 5 Enable Key

NOTE: All SWEEP parameters are adjustable with the PARAM SET key by repeatedly pressing Function D Enable Key and entering the appropriate values on the Function Row number keys. A longer RATE will give the technician more time to record the results.

Recommended settings:
LEVL = 0 dBm
STRT = Start of sweep (0.304 kHz)
STOP = End of sweep (3.004 kHz)
STEP = Step size of frequency (0.100 kHz)
RATE = Duration of each tone (3.0/5.0 sec)
DLAY = Time inserted before & after sweep sequence (2.0 sec)

Press Function — 5 Enable Key to restart the sweep sequence

(44) Record the levels on the portable TIMS for TX path frequencies between 300 Hz and 3 kHz. Select Send QUIET on the rack mounted TIMS when test is completed.

(45) After tests have been completed, select Stop Test. When the message "Test Stopped" is displayed, select ESCAPE button twice.

(46) When testing of this G/G interface circuit is completed, remove the patch cord at the TIMS. Then remove the patch cord between IDF EQ jacks and the Test jack (JEWEL).

(47) Click on Screen then Summary Status from the pull down menu.

(48) At the Trunk INTFC screen, click on the trunk interface under test.

(49) Click on Verif pull down menu then Start Tests button. If all tests pass, click on Rtn Svc and OK buttons.

(50) When recovery of the interface is completed, click on the ESCAPE button.

131.–169. RESERVED.

Section 2. OTHER MAINTENANCE TASK PROCEDURES

170. CLEAN AND CHECK CLX HIGH SPEED PRINTER.

a. Object. To ensure proper operation of the printer.

b. Discussion. None.

c. Test Equipment Required. Soft brush and small vacuum cleaner.

d. Conditions. Printer is not available during this procedure.

e. Detailed Procedure.

(1) Turn power OFF to the printer.

(2) Open top cover.

(3) Remove paper from the printer.

(4) With a soft brush and vacuum cleaner, remove any paper dust that may have accumulated on the printer mechanism.

(5) Check ribbon and if print quality is poor or if ribbon shows extreme wear, replace the ribbon cartridge.

(6) Physically inspect the printer for wear or loose parts.

(7) Install paper, close cover and turn on power to the printer.

(8) Press ONLINE button to take printer offline.

(9) Press TEST button.

Function # 0 is displayed

(10) Press ENTER button.

Function # 5 is displayed
Decimal point is flashing

(11) Self test will execute and two pages of test print will be printed.

(12) Press FORM FEED button to exit paper.

(13) Inspect printout for quality of print.

(14) Press ONLINE button to place printer online.

(15) Log on to the Tandem OPS console as SUPER.STARTUP.

(16) Type: PRINT [any filename].

NOTE: Ensure file type is 101 to avoid printer problems.

(17) Verify the file was printed correctly.

171. RESERVED.

172. CLEAN AND CHECK WORKSTATION PRINTERS.

a. Object. To ensure proper operation of the printer.

b. Discussion. None.

c. Test Equipment Required. Soft brush and small vacuum cleaner.

d. Conditions. Printer is not available during this procedure.

e. Detailed Procedure.

(1) Turn power OFF to the printer.

(2) Remove paper from the printer.

(3) With a soft brush and vacuum cleaner, remove any paper dust that may have accumulated on the printer mechanism.

(4) Check ribbon and if print quality is poor or if ribbon shows extreme wear, replace the ribbon cartridge.

(5) Physically inspect the printer for wear or loose parts.

(6) Install paper and close cover.

(7) While pressing the ONLINE key, turn ON power to the printer. Release key after printing starts. A sliding character set test pattern will be printed.

(8) To discontinue the test, turn OFF the printer.

(9) Turn ON power to the printer.

(10) Place the printer online.

173. CHECK TANDEM CLX TAPE/DISK DRIVE COOLING FANS.

a. Object. To ensure proper operation of tape/disk drive cooling fans.

b. Discussion. None.

c. Test Equipment Required. A 5/32" hex wrench.

d. Conditions. This procedure can be performed at anytime.

e. Detailed Procedure.

(1) At rear of cabinet locate hole in center of air grille panel.

(2) Insert 5/32" hex wrench in hole, turn 1/4 turn counter clockwise and lower the air grille panel.

(3) Place hand behind each disk drive tray fan and check for air flow.

(4) Repair or replace any fans that are not running.

(5) Close air grille panel and lock closed by turning 5/32" hex wrench 1/4 turn clockwise.

174. CHECK TANDEM CLX COOLING FANS.

a. Object. To ensure proper operation of system cooling fans.

b. Discussion. None.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Open Tandem cabinet front door.

(2) Verify that two cabinet cooling fans and two power supply cooling fans in the bottom of each cabinet are running and that nothing is blocking the air flow through these fans.

(3) Repair or replace any fans that are not running.

(4) Close and latch cabinet front door.

175. CHECK TANDEM CLX AIR FILTERS.

a. Object. To ensure adequate air flow for cooling.

b. Discussion. None.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Push down on the tab at the top center of the air grille on lower part of cabinet front door. Tilt the grill toward you. A cable restraint prevents the grill from falling forward.

(2) Grasp the filter at the upper corners and carefully lift out.

(3) Clean filter with appropriate vacuum cleaner. If you cannot see light clearly through most areas of the filter, replace it with a new one.

(4) Hold filter at upper corners and place filter inside the grill. Make sure the filter is positioned squarely. Arrows on each edge of the filter indicate airflow direction; make sure these arrows point toward the CLX, not toward you.

(5) Push grill closed until latched.

176. BACKUP TANDEM CLX OLDLOG FILE TO CARTRIDGE TAPE UNIT.

a. Object. To back up to tape $DATA5.MAINT.OLDLOG which contains the previous month Tandem OPRLOG.

b. Discussion. This procedure will back up the OLDLOG file to tape and then purge the file of data.

NOTE: Before using new tapes for the first time, execute the LABEL/UNLABEL command on each tape to prevent the system rejecting the tape. If the tapes are labeled, they must be unlabled before using. Consult the Tandem Disk and Tape

Utilities Reference Manual for use of the LABEL/UNLABEL command.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

NOTE: Be sure no one else is using Tape Management before running this procedure.

e. Detailed Procedure.

(1) Log onto the system as SUPER.STARTUP.

(2) Insert a blank cartridge tape into the tape drive and press the load button.

(3) Enter the following command:

RUN $DATA5.MAINT.MONTHLOG <enter>

(4) When completed, label and save the tape for 30 days.

(5) Log off SUPER.STARTUP.

177. CLEAN TANDEM CLX CARTRIDGE TAPE DRIVE.

a. Object. To ensure proper operation of cartridge magnetic tape unit.

b. Discussion.

(1) The read/write heads on the cartridge tape drive need regular cleaning to ensure best performance. To clean the tape drive heads, use a cleaning cartridge such as the one shipped with the CLX system.

(2) Each cleaning cartridge (Part No. 02431) is effective for 100 uses. The cartridge label contains 100 circles in which you record each cleaning:

(a) Mark a circle on the label after each cleaning.

(b) Discard the cartridge after 100 uses.

(3) Tandem recommends that you use the cleaning cartridge approximately once a week (after each 8 hours of continuous tape operation).

c. Test Equipment Required. Tape cleaning cartridge.

d. Conditions. Cartridge tape unit is not available during this procedure.

e. Detailed Procedure.

(1) Press the Unload button to open the tape drive door.

(2) Insert the cleaning cartridge and push the drive door closed until you hear it lock (click) into place.

(3) Press the load button. The cleaning process begins immediately, and the Load light flashes during the cleaning. The process, which takes about three minutes, is noisy. When cleaning is complete, the Load light stops flashing and the Unload light is lit steadily.

(4) Press the Unload button to open the drive door.

(5) Gently push down on the drive door until you hear it click and the drive ejects the tape. Remove the cleaning cartridge. Record this cleaning on the label of the cleaning cartridge and store the cartridge for future use.

(6) Repeat this procedure for all tape drives in the system.

178. CHECK A/G, G/G, AND FOTT CABINET COOLING FANS AND AIR FILTERS.

a. Object. To verify that the fans are functioning properly and air filters are clean.

b. Discussion. Each A/G & G/G cabinet has four fans located at the top of the cabinet between the top shelf and the cabinet air grill. These fans have anti-rotation and air flow verifier devices on them and do not need to be checked for proper air flow. There are air baffles located on top of the A/G and G/G cabinets.

(1) There is one fan on the rear of each of the four power supplies that are located on the right side of the cabinet.

(2) There are two air filters located on the inside of the front cabinet door and one in the bottom front of the cabinet.

(3) Each FOTT cabinet has two fans located in the middle of the cabinet, just under the circuit card shelf, and an air filter in the bottom of the cabinet.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Open the A/G or G/G cabinet front door and remove door air filters and bottom air filter. Replace as needed.

(2) Open FOTT cabinet front door and CAREFULLY place hand or piece of paper under the fan near the front of the cabinet and check for upward air flow. Remove the air filter by pulling straight out. Replace as needed.

(3) Open FOTT cabinet rear door and CAREFULLY place hand or piece of paper under the fan near the rear of the cabinet and check for upward air flow.

(4) Check the shelf power supply fan for outward air flow, by placing hand or piece of paper behind the fan at the rear of each power supply, or for inward air flow by placing hand or piece of paper in front of the air intake grill at the front of the power supply.

(5) Close all cabinet doors.

(6) Repeat this procedure for all A/G, G/G, and FOTT cabinets in the system.

179. CHECK TEST EQUIPMENT RACK CABINET COOLING FANS/AIR FILTER.

a. Object. To verify that the fans are functioning properly and the air filter is clean.

b. Discussion. There are two fans on the DMC; one fan in the top of the cabinet, one fan and one air filter in the base of the cabinet.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Open cabinet rear door.

(2) Place hand behind the two fans on the DMC and check for air flow.

(3) Place hand above one fan in the top of the cabinet and above one fan in the base of the cabinet and check for air flow.

(4) Remove air filter from beneath fan in base of cabinet by pulling straight out. Replace as needed.

(5) Close cabinet rear door.

180. CHECK TIMING EQUIPMENT RACK CABINET COOLING FANS/AIR FILTER.

a. Object. To verify that the fans are functioning properly and the air filter is clean.

b. Discussion. There are two fans on the DMC; one fan in the top of the cabinet, one fan and one air filter in the base of the cabinet.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Open cabinet rear door.

(2) Place hand behind the two fans on the DMC and check for air flow.

(3) Place hand above one fan in the top of the cabinet and above one fan in the base of the cabinet and check for air flow.

(4) Remove air filter from beneath fan in base of cabinet by pulling straight out. Replace as needed.

(5) Close rear cabinet door.

181. CHECK ANCILLARY RACK CABINET COOLING FANS/AIR FILTER.

a. Object. To verify that the fans are functioning properly and the air filter is clean.

b. Discussion. There is one fan in the top of the cabinet, one fan and one air filter in the base of the cabinet.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Open cabinet rear door.

(2) Place hand above one fan in the top of the cabinet and above one fan in the base of the cabinet and check for air flow.

(3) Remove air filter from beneath fan in base of cabinet by pulling straight out. Replace as needed.

(4) Close rear cabinet door.

182. CHECK VCE COOLING FAN AND AIR FILTER.

a. Object. To ensure that the cooling fan is operational, air filter is clean and air flow is sufficient.

b. Discussion. The air filter is located at the bottom center of the cabinet for the MPES, Area Supervisor position, Area Manager position and NOM position. VEM's located at the M1 consoles have air filters directly under the VEM.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Open console cabinet rear door.

(2) Place hand behind fan and check for air flow.

(3) Remove air filter by pulling straight out and replace as needed.

(4) Close cabinet door.

(5) Using the Lift Cart or step ladder at VEM's located at the M1 consoles, place hand over fan and check for air flow.

(6) Remove air filter by pulling straight out and replace as needed.

(7) Repeat for all VEM's in the system.

183. PERFORM COMPLETE BACKUP OF TANDEM SYSTEM.

a. Object. To back up all files to prevent loss of data if a catastrophic system failure occurs.

b. Discussion. It is recommended that each disk drive be backed up separately. In the event of an error during backup it will be less time consuming to restart the process. It will also make it more selective when doing a restore.

NOTE: Before using new tapes for the first time, execute the LABEL/UNLABEL command on each tape to prevent the system rejecting the tape. If the tapes are labeled, they must be unlabled before using. Consult the Tandem Disk and Tape Utilities Reference Manual for use of the UNLABEL command.

c. Test Equipment Required. None.

d. Conditions. This procedure should be performed during a period of slow traffic.

e. Detailed Procedure.

(1) Log onto the Tandem system console as SUPER.SUPER.

(2) Insert a blank cartridge tape into the tape drive and press the load button.

(3) Enter the following command:

BACKUP /OUT $S/ $TAPE[n],*.*.*,OPEN, AUDITED,LISTALL, VERIFYREEL <enter>

NOTE: *.*.* = one of the following:

$SYSTEM.*.*
$DATA1.*.*
$DATA2.*.*
$DATA3.*.*
$DATA5.*.*

(4) When complete, label and save the tape and the LISTALL printout. Multiple cartridge tapes will be required to backup the entire system.

(5) Log off SUPER.SUPER.

184. CLEAN SUPERVISORY RECORDER TAPE HEADS.

a. Object. To ensure proper operation of the cartridge magnetic tape unit.

b. Discussion. Tape head cleaning fluid is flammable and toxic to the eyes, skin, and respiratory tract. Avoid repeated prolonged contact. Good, general ventilation is normally adequate.

c. Test Equipment Required. Tape cleaning fluid, cotton swabs, and a clean soft cloth.

d. Conditions. Magnetic tape unit is not available during this procedure.

e. Detailed Procedure.

(1) Turn recorders off.

(2) Eject tape from recorder.

(3) Apply small amounts of cleaning fluid to cotton swab.

(4) Apply cleaning fluid to tape heads, guides, pressure rollers, capstan, and all other exposed metal parts inside the recorder.

NOTE: Avoid using excess liquid on rubber parts.

(5) Allow parts to dry.

(6) Repeat for all tape transports at workstation.

(7) Reinstall cassettes into recorders.

(8) Turn recorders on.

185. CHECK DSR MULTIPORT TRANSCEIVER CABINET AIR FILTER.

a. Object. To verify the air filter is clean.

b. Discussion. There is one air filter in the base of the cabinet.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

Remove air filter in base of cabinet by pulling straight out. Replace as needed.

186. CHECK A/G AND G/G SWITCH SHELF POWER SUPPLY LED'S AND PCC INDICATORS.

a. Object. To verify that the Switching Subsystem power supplies are functioning properly.

b. Discussion.

(1) There is a condition that can exist whereby the inputs to the Power Alarm Board (PAB), from the power supplies, can be defective and a power supply failure alarm will not be reported. BIT/AFI will not report the PAB as being defective because it checks the PAB from the alarm output to common equipment side of the CCA. In this situation a failed peripheral shelf power supply may not be detected for three months (the frequency of Par. 117). This paragraph provides for a more frequent visual check of the power supply LED's.

(2) There are four shelf power supplies on the right side of each A/G & G/G cabinet:

(a) A/G Control cabinet or G/G Node cabinet location A7, PS1, is power for Common Equipment Shelf A1.

(b) A/G Control cabinet or G/G Node cabinet location A7, PS2, is power for Common Equipment Shelf A2.

(c) A/G Expansion cabinet location A7, PS1 & PS2, are redundant power for Peripheral Shelves A1, A2, A3.

(d) A/G control cabinet, A/G Expansion cabinet, and G/G Node cabinet location A8, PS1 & PS2, are redundant power for Peripheral Shelves A4, A5, A6.

(3) There are two power circuit breakers and two fan circuit breakers with related visual indicators on the PCC in the base of the cabinet.

(4) There are two AC indicators on the top front of the cabinet.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Check for two lit AC indicators on the top front of the cabinet.

(2) Open the cabinet front door and check for a lit green LED for AC1, AC2, and DC on the four shelf power supplies. Check for two lit power indicators and two lit fan indicators on the PCC in the base of the cabinet.

(3) Close cabinet front door.

187.–199. RESERVED.

Section 3. SPECIAL MAINTENANCE PROCEDURES

200. CHECK VCE POWER SUPPLY LED'S AND VOLTAGES.

a. Object. To verify that the VCE power supplies are functioning properly.

b. Discussion. In par 200e, Steps (1) through (6) are for the VEM's located at the MPES and ancillary positions. Steps (3) and (4) will be repeated for the VEM's located at the M1 consoles.

c. Test Equipment Required. Digital VOM.

d. Conditions. This procedure can be performed anytime.

e. Detailed Procedure.

(1) Open cabinet rear door.

(2) On the outside bottom edges of the equipment shelf push the two latches towards the center to release them and carefully slide the VEM out of the cabinet.

CAUTION: Exercise caution when sliding the shelf out. Be sure that the cables do not get caught on the edges of the cabinet.

(3) Check for a lit green J1 and J2 LED's on the power supply.

(4) Using a digital VOM connect the black probe to GND test point and measure the voltages on the +5, +15, −15, +24.2, and 13.75 V dc test points.

(5) Slide and lock the VEM shelf into the VCE cabinet.

(6) Close cabinet door.

(7) Repeat par 200e, steps (3) and (4) for the VEM located at the M1 console.

201. REPLACEMENT OF THE LIEBERT POWER CONDITIONER EMERGENCY POWER OFF SWITCH LED'S.

a. Object. To replace the LED of the Emergency Power Off (EPO) switch.

b. Discussion. Exercise extreme care when performing this procedure. If it is not done correctly, the power conditioner can accidentally be powered down while changing the LED.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Open the Right Front Door of the Liebert Cabinet

(2) Locate the rear of the Power Monitor Display assembly (upper left side on the rear of the right side cabinet door). Refer to Figure 5−2 for identification of wire #323 and lug connection..

(3) Remove a white wire, #323, (spade and lug connection) from the top switch, left side, middle lug, labeled C. Removing wire #323 will prevent an inadvertent shut down of the power conditioner when installing the LED and switch lens cover.

(4) Remove the lens cover of the EPO switch. Replace the LED and reinstall the lens cover.

(5) Reconnect the White Wire, #323, (previously removed) to the EPO switch.

(6) Close and latch the front door of the Liebert Cabinet.

202.−209. RESERVED.

CAUTION: CARE SHOULD BE TAKEN TO ENSURE REMOVAL OF THE CORRECT WIRE. REMOVAL OF THE WRONG WIRE ON THIS SWITCH MAY RESULT IN A POWER DOWN OF THE LIEBERT POWER CONDITIONER WHEN LENS COVER IS REINSTALLED.

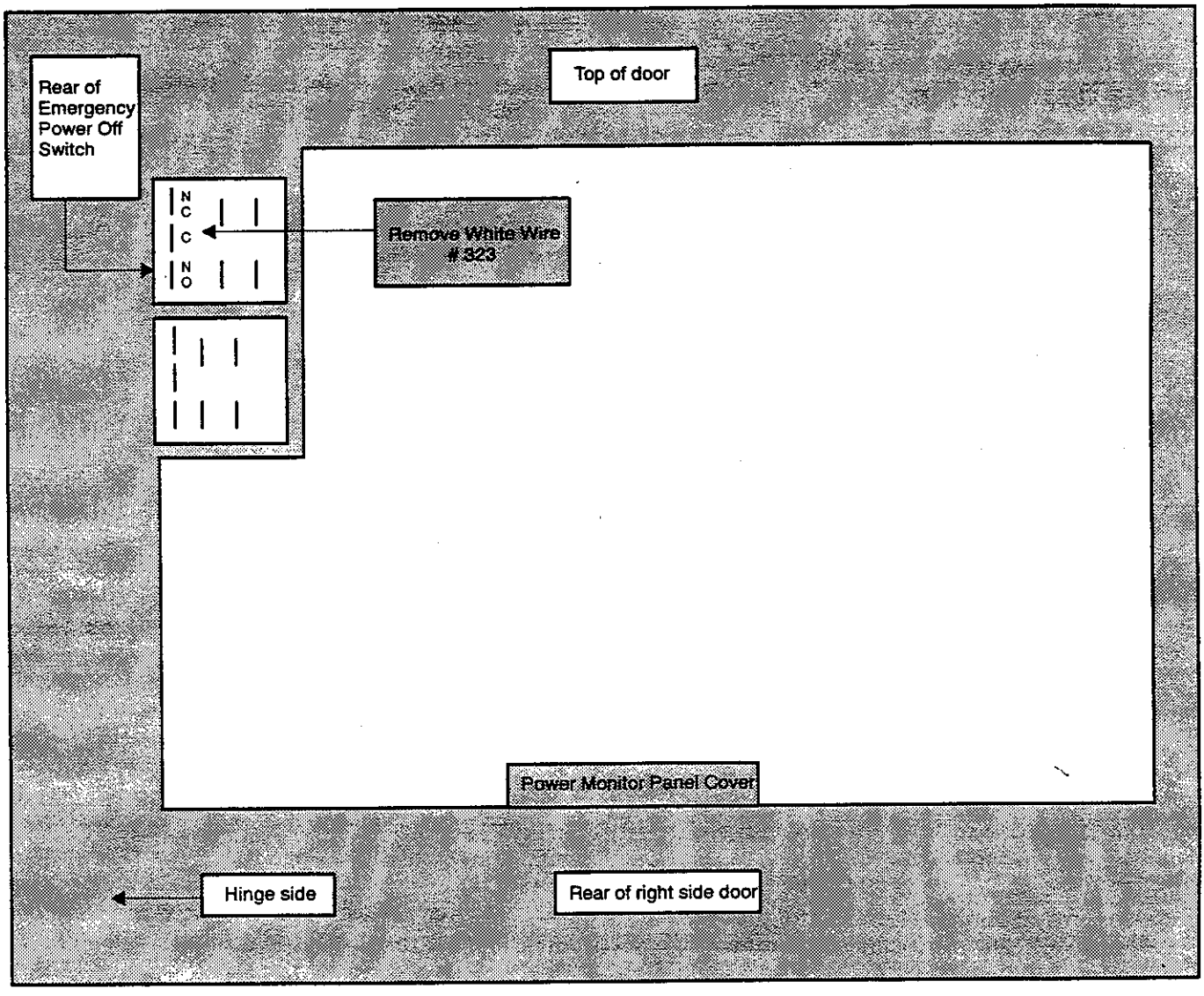

FIGURE 5-2. REAR VIEW OF LIEBERT POWER MONITOR DISPLAY

CHAPTER 6. GLOSSARY OF ACRONYMS AND TERMS

210. GLOSSARY.

A glossary of acronyms, terms, and signals is provided in the following paragraphs.

List of acronyms. The acronyms used in this manual are as follows:

ac	Alternating Current
AF	Airway Facility
AFVLT	AF VSCS Logistics Team
A/G	Air-to-Ground
AMIC	Area Manager In Charge
ANSI	American National Standards Institute
AOP	NAS Operations
AOS	Operational Support
ARTCC	Air Route Traffic Control Center
ASCII	American Standard Code for Information Interchange
AT	Air Traffic
ATC	Air Traffic Control
ATO	Air Traffic Operations
AVP	Automated Verification Process
BIC	Backplane Interconnect Cards
BIT	Built-in Test
BITE	Built-in Test Equipment
BOB	Break Out Box
BUEC	Backup Emergency Communications
CAI	Contractor Acceptance Inspection
CC	Common Console
CCA	Circuit Card Assembly
CCS	Common Channel Signaling
CDRL	Contractor Data Requirements List
CHI	Computer Human Interface
CIU	Communications Interface Units
CLIP	Communications Line Interface Processor
CM	Configuration Management
CPU	Central Processing Unit
CS	Control Subsystem
CSCI	Computer Software Configuration Item
CSMA/CD	Carrier Sense Multiple Access/Collision Detection
CSS	Communications Subsystem
CSS	Cutover Switch Subsystem
DA	Direct Access
dc	Direct Current
DCE	Date Communication Equipment
DEO	Data Entry Operator
DJM	Dual Jack Module
DLU	Digital Line Unit
DMC	Discrete Monitor Controller
DMTO	Dead Man Timeout
DSR	Display System Replacement
DTE	Date Terminal Equipment
DTMF	Dual-Tone Multi-Frequency
DYSIM	Dynamic Simulation
EMM	Event Message Monitor
EN/DIS	Enable/Disable
ESD	Electrostatic Discharge
FOTT	Fiber Optic Tie Trunk
FRDF	Facilities Reference Data File
FTS	Federal Telephone System
GFE	Government Furnished Equipment

G/G	Ground-to-Ground
GRIM	Grim Corporation Equipment
HCPU	High Speed Central Processor Unit
HCVR	High Capacity Voice Recorder
HS	Head Set/Hand Set
HSP	High Speed Printer
HWCI	Hardware Configuration Item
IA	Indirect Access
IC	Intercom
IDF	Intermediate Distribution Frame
IP	Interphone
IPB	Interprocessor Bus
IPS	Interruptible Power Supply
IR	Infrared
ISSS	Initial Sector Suite System
LAN	Local Area Network
LED	Light Emitting Diode
LIU	Line Interface Unit
LRU	Line Replaceable Unit
LS	Loudspeaker
LSO	Loop Start Office
LSS	Loop Start Station
LTP	Logical To Physical
LU/LE	Logical Unit/Logical Entity
MCT	Master Configuration Table
MDB	Maintenance and Diagnostic Bus
MDP	Maintenance and Diagnostic Processor
MDS	Maintenance and Diagnostic System
MFC	Multifunction Controller
MMS	Maintenance Management System
MPES	Maintenance Position Equipment Subsystem
M/S	Main/Standby
MTTR	Mean Time To Repair
NAPRS	National Airspace Performance Reporting System
NAS	National Airspace System
NCP	National Change Proposal
NOM	NAS Operations Manager
NSN	National Stock Number
OLP	Online Primary
OOS	Out Of Service
OPSCSL	Operations Console
ORD	Operational Readiness Demonstration
OSC	Online Support Center
PABX	Private Automatic Branch Exchange
PAT	Production Acceptance Testing
PC	Personal Computer
PCC	Power Control Conditioner
PCM	Pulse Code Modulation
PCS	Power Condition System
PDSS	Position Discrete Signal Switch
PDU	Power Distribution Unit
PEM	Position Equipment Module
PMM	Power and Maintenance Monitor
P–Node	Position Node
PPI	Planned Product Improvement
PTT	Push-to-Talk
RBT	Remote Bulk Transfer Switch
RCAG	Remote Control A/G
RD	Ring Down
RDNS	Ring Down No Supervision
RIF	Radio Interface
RMI	Remote Maintenance Interface
R–Node	Radio Node
RT	Remote Terminal
RX	Receive
SAD	Site Adaptation Data
SBIU	Switch Bus Interface Unit

SC	Single Circuit
SCF	Site Change Form
SCP	System Control Panel
SIS	System Interconnect Subsystem
SMC	System Monitor and Control
SMO	System Maintenance Operator
SMP	System Maintenance Position
SS	Switching System
SW	Switch
TED	Touch Entry Device
TELCO	Telephone Company
TIMS	Transmission Impairment Measurement Set
TMDS	Tandem Maintenance and Diagnostic System
TMU	Traffic Management Unit
TPA	Terminated Panel Assembly
TRACON	Terminal Radar Approach Control
TX	Transmit
UHF	Ultra High Frequency
UPS	Uninterruptible Power Supply
V	Volt
VCE	VSCS Console Equipment
VCET	VSCS Console Equipment Trainer
VCT	Voice Channel Testing
VCU	Voice Combiner Unit
VDM	VSCS Display Module
VEM	VSCS Equipment Module
VF	Voice Frequency
VFSS	Voice Frequency Signaling System
VGA	Video Graphics Adapter
VHF	Very High Frequency
VIK	VSCS Interactive Keypad
VPC	VCE Personal Computer
VPU	VSCS Power Unit
VR	Virtual Radio
VSCS	Voice Switching and Control System
VTABS	VSCS Training & Backup System
WS	Workstation

211.–219. RESERVED.

CASE FILE/ NAS CHANGE PROPOSAL (Please type or print neatly)	For CM Use	Case File Received Date	NCP Issuance Date	NCP Number	Page 1 of ___

1. Case File Number

2. Prescreening Office ☐ ASM– ☐ ATR– ☐ ASE–500 ☐ ANS–200 ☐ AFE–100 ☐ APM–100 ☐ _____

3. Scope of Change ☐ Local ☐ National ☐ Test ☐ CIP

4. Program Element ☐ Air Traffic Control ☐ Ground-to-Air ☐ Interfacility Comm ☐ Maint & Opns Support ☐ _____

5. Life-Cycle Baseline ☐ Requirements Determination ☐ Operational

Acquisition: ☐ Functional ☐ Design ☐ Allocated ☐ Product

6. Priority ☐ Normal ☐ Time-Critical ☐ Urgent

7. Supplemental Change Form ☐ ECR/ECP ☐ TES ☐ _____

7a. Supplemental Change No. _____

7b. Supplemental Change Initiation Date _____

8. Case File Originator

9. Originator's Organization

10. Telephone Number

11. Case File Initiation Date

12. Baseline Document Type ☐ CPFS ☐ SPEC ☐ MTBK ☐ _____ ☐ TI ☐ DWG ☐ IRD/ICT

13. Baseline Document Number(s)

14. CI Subsystem Designator

15. FA Type

16. CI Component Designator

17. Facility Identifier (FACID)

18. Facility Code (FACCODE)

19. Cost Center Code

20. Software System Version

21. Title (as descriptive as possible including location and runway number if applicable)

22. Description: (a) identification of problem, (b) proposed change, (c) interface impact, (d) cost, (e) benefits, (f) schedule, (g) justification of time-critical/urgent status

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FAA Form 1800-2 (11–90) — Supersedes Previous Edition

Case File Number	NCP Number	Page 2 of ___

23. Name and Title of Originator's Immediate Supervisor (Type/Print Clearly)	Signature	Date

24. Facility/Sector Review (AT/AF)

Name	Routing Symbol	Date	Concur	Non-Concur

Routing Symbol	Signature
Date	
Routing Symbol	Signature
Date	

24a. Comments

(Attach additional sheets if necessary)

25. Regional Review (AT/AF/FS/AS)

Name	Routing Symbol	Date	Concur	Non-Concur

☐ Recommend Approval (Enter into CM/STAT. Forward to Prescreening) ☐ Disapprove (Return to Originator)

Routing Symbol	Signature
Date	
Routing Symbol	Signature
Date	
Routing Symbol	Signature/Configuration Mgr/NCP Coordinator/ Reg Exec Sec
Date	

25a. Comments

(Attach additional sheets if necessary)

26. Prescreening Review Organization Comment

(Attach additional sheets if necessary

Reviewers	Routing Symbol	Date	Concur	Non-Concur

Recommended Must Evaluators

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Routing Symbol	Signature
Date	

27. Configuration Management Use Only

CASE FILE/ NAS CHANGE PROPOSAL (Please type or print neatly)	For CM Use	Case File Received Date	NCP Issuance Date	NCP Number	Page 1 of ___

1. Case File Number

2. Prescreening Office ☐ ASM- ☐ ATR- ☐ ASE-500 ☐ ANS-200 ☐ AFE-100 ☐ APM-100 ☐ _____

3. Scope of Change ☐ Local ☐ National ☐ Test ☐ CIP

4. Program Element ☐ Air Traffic Control ☐ Ground-to-Air ☐ Interfacility Comm ☐ Maint & Opns Support ☐ _____

5. Life-Cycle Baseline ☐ Requirements Determination ☐ Operational
Acquisition: ☐ Functional ☐ Allocated ☐ Design ☐ Product

6. Priority ☐ Normal ☐ Time-Critical ☐ Urgent

7. Supplemental Change Form ☐ ECR/ECP ☐ TES ☐ _____
7a. Supplemental Change No. _____
7b. Supplemental Change Initiation Date _____

8. Case File Originator

9. Originator's Organization

10. Telephone Number

11. Case File Initiation Date

12. Baseline Document Type ☐ CPFS ☐ SPEC ☐ MTBK ☐ _____ ☐ TI ☐ DWG ☐ IRD/ICT

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16. CI Component Designator

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Routing Symbol	Signature
Date	

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Routing Symbol	Signature
Date	
Routing Symbol	Signature/Configuration Mgr/NCP Coordinator/ Reg Exec Sec
Date	

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26. Prescreening Review Organization Comment

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Reviewers	Routing Symbol	Date	Concur	Non-Concur

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Recommended Must Evaluators

27. Configuration Management Use Only

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1. Case File Number

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3. Scope of Change ☐ Local ☐ National ☐ Test ☐ CIP

4. Program Element ☐ Air Traffic Control ☐ Ground-to-Air ☐ Interfacility Comm ☐ Maint & Opns Support ☐ _____

5. Life-Cycle Baseline ☐ Requirements Determination ☐ Operational
Acquisition: ☐ Functional ☐ Allocated ☐ Design ☐ Product

6. Priority ☐ Normal ☐ Time-Critical ☐ Urgent

7. Supplemental Change Form ☐ ECR/ECP ☐ TES ☐ _____
7a. Supplemental Change No. _____
7b. Supplemental Change Initiation Date _____

8. Case File Originator

9. Originator's Organization

10. Telephone Number

11. Case File Initiation Date

12. Baseline Document Type ☐ CPFS ☐ TI ☐ SPEC ☐ DWG ☐ MTBK ☐ IRD/ICT ☐ _____

13. Baseline Document Number(s)

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15. FA Type

16. CI Component Designator

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Routing Symbol	Signature
Date	

Routing Symbol	Signature
Date	

24a. Comments

(Attach additional sheets if necessary)

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Routing Symbol	Signature
Date	

Routing Symbol	Signature
Date	

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Reviewers	Routing Symbol	Date	Concur	Non-Concur

Recommended Must Evaluators

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Date	

27. Configuration Management Use Only

CASE FILE/ NAS CHANGE PROPOSAL (Please type or print neatly)	For CM Use	Case File Received Date	NCP Issuance Date	NCP Number	Page 1 of ___

1. Case File Number	2. Prescreening Office	☐ ASM- ☐ ATR- ☐ ASE-500 ☐ ANS-200 ☐ AFE-100 ☐ APM-100 ☐ _____

3. Scope of Change	4. Program Element
☐ Local ☐ National ☐ Test ☐ CIP	☐ Air Traffic Control ☐ Ground-to-Air ☐ Interfacility Comm ☐ Maint & Opns Support ☐ _____

5. Life-Cycle Baseline	6. Priority	7. Supplemental Change Form
☐ Requirements Determination ☐ Operational Acquisition: ☐ Functional ☐ Design ☐ Allocated ☐ Product	☐ Normal ☐ Time-Critical ☐ Urgent	☐ ECR/ECP ☐ TES ☐ _____ 7a. Supplemental Change No. _____ 7b. Supplemental Change Initiation Date _____

8. Case File Originator	9. Originator's Organization	10. Telephone Number	11. Case File Initiation Date

12. Baseline Document Type	13. Baseline Document Number(s)
☐ CPFS ☐ SPEC ☐ MTBK ☐ _____ ☐ TI ☐ DWG ☐ IRD/ICT	

14. CI Subsystem Designator	15. FA Type	16. CI Component Designator

17. Facility Identifier (FACID)	18. Facility Code (FACCODE)	19. Cost Center Code	20. Software System Version

21. Title (as descriptive as possible including location and runway number if applicable)

22. Description: (a) identification of problem, (b) proposed change, (c) interface impact, (d) cost, (e) benefits, (f) schedule, (g) justification of time-critical/urgent status

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Routing Symbol	Signature
Date	
Routing Symbol	Signature
Date	

24a. Comments

(Attach additional sheets if necessary)

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Date	
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Reviewers	Routing Symbol	Date	Concur	Non-Concur

Recommended Must Evaluators

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27. Configuration Management Use Only

CASE FILE/ NAS CHANGE PROPOSAL (Please type or print neatly)	For CM Use	Case File Received Date	NCP Issuance Date	NCP Number	Page 1 of ___

1. Case File Number

2. Prescreening Office ☐ ASM– ☐ ASE–500 ☐ AFE–100 ☐ _____ ☐ ATR– ☐ ANS–200 ☐ APM–100

3. Scope of Change ☐ Local ☐ National ☐ Test ☐ CIP

4. Program Element ☐ Air Traffic Control ☐ Interfacility Comm ☐ _____ ☐ Ground-to-Air ☐ Maint & Opns Support

5. Life-Cycle Baseline ☐ Requirements Determination ☐ Operational

Acquisition: ☐ Functional ☐ Design ☐ Allocated ☐ Product

6. Priority ☐ Normal ☐ Time-Critical ☐ Urgent

7. Supplemental Change Form ☐ ECR/ECP ☐ TES ☐ _____

7a. Supplemental Change No. _____

7b. Supplemental Change Initiation Date _____

8. Case File Originator	9. Originator's Organization	10. Telephone Number	11. Case File Initiation Date

12. Baseline Document Type ☐ CPFS ☐ SPEC ☐ MTBK ☐ _____ ☐ TI ☐ DWG ☐ IRD/ICT

13. Baseline Document Number(s)

14. CI Subsystem Designator	15. FA Type	16. CI Component Designator

17. Facility Identifier (FACID)	18. Facility Code (FACCODE)	19. Cost Center Code	20. Software System Version

21. Title (as descriptive as possible including location and runway number if applicable)

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Reviewers	Routing Symbol	Date	Concur	Non-Concur

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27. Configuration Management Use Only

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1. Case File Number

2. Prescreening Office ☐ ASM- ☐ ASE-500 ☐ AFE-100 ☐ _____ ☐ ATR- ☐ ANS-200 ☐ APM-100

3. Scope of Change ☐ Local ☐ National ☐ Test ☐ CIP

4. Program Element ☐ Air Traffic Control ☐ Interfacility Comm ☐ _____ ☐ Ground-to-Air ☐ Maint & Opns Support

5. Life-Cycle Baseline ☐ Requirements Determination ☐ Operational
Acquisition: ☐ Functional ☐ Design ☐ Allocated ☐ Product

6. Priority ☐ Normal ☐ Time-Critical ☐ Urgent

7. Supplemental Change Form ☐ ECR/ECP ☐ TES ☐ _____
7a. Supplemental Change No. _____
7b. Supplemental Change Initiation Date _____

8. Case File Originator

9. Originator's Organization

10. Telephone Number

11. Case File Initiation Date

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Routing Symbol	Signature
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Reviewers	Routing Symbol	Date	Concur	Non-Concur

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27. Configuration Management Use Only

CASE FILE/ NAS CHANGE PROPOSAL (Please type or print neatly)	For CM Use	Case File Received Date	NCP Issuance Date	NCP Number	Page 1 of ___

1. Case File Number

2. Prescreening Office ☐ ASM– ☐ ATR– ☐ ASE–500 ☐ ANS–200 ☐ AFE–100 ☐ APM–100 ☐ _____

3. Scope of Change ☐ Local ☐ National ☐ Test ☐ CIP

4. Program Element ☐ Air Traffic Control ☐ Ground-to-Air ☐ Interfacility Comm ☐ Maint & Opns Support ☐ _____

5. Life-Cycle Baseline ☐ Requirements Determination ☐ Operational
Acquisition: ☐ Functional ☐ Allocated ☐ Design ☐ Product

6. Priority ☐ Normal ☐ Time-Critical ☐ Urgent

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